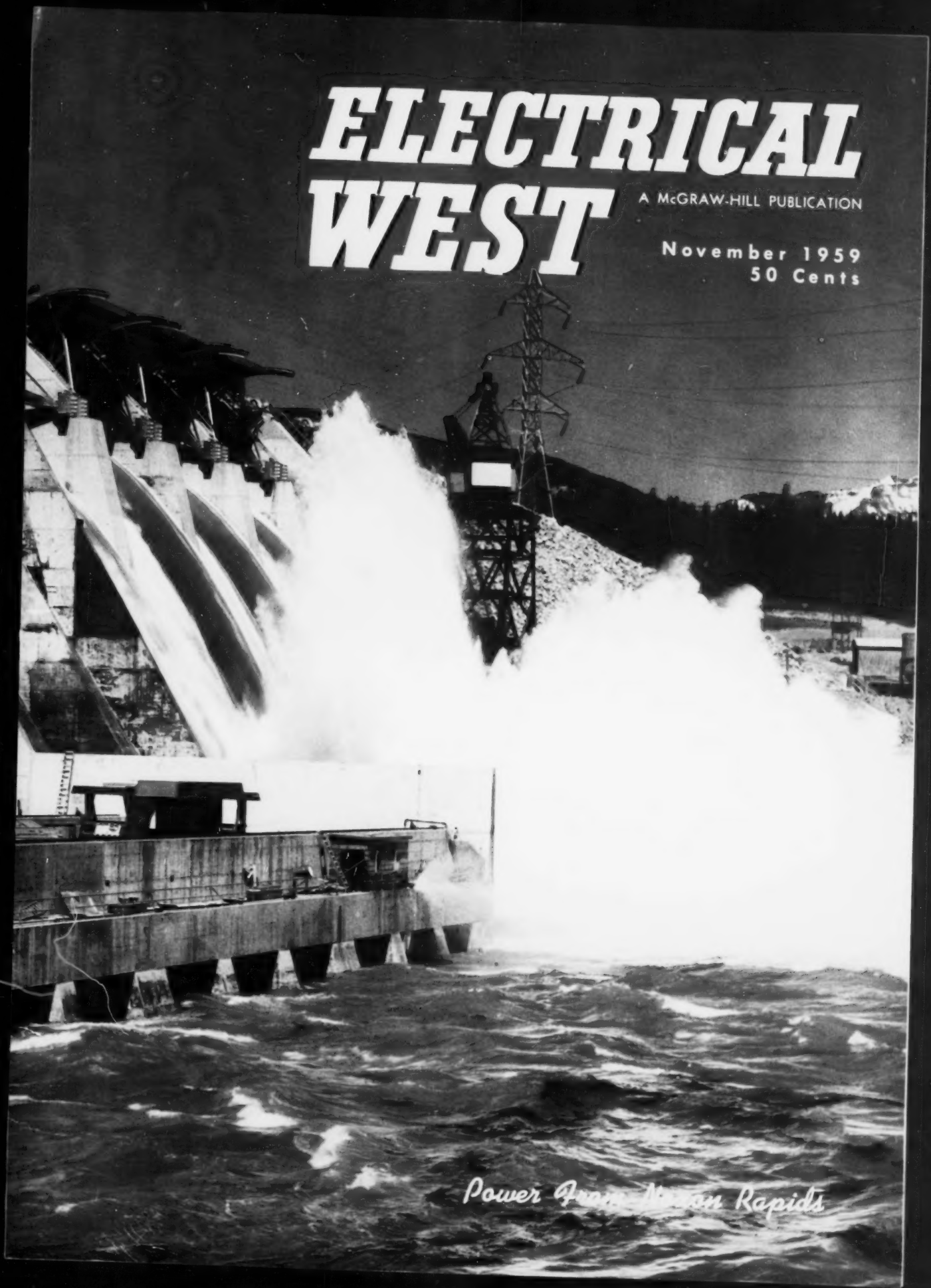
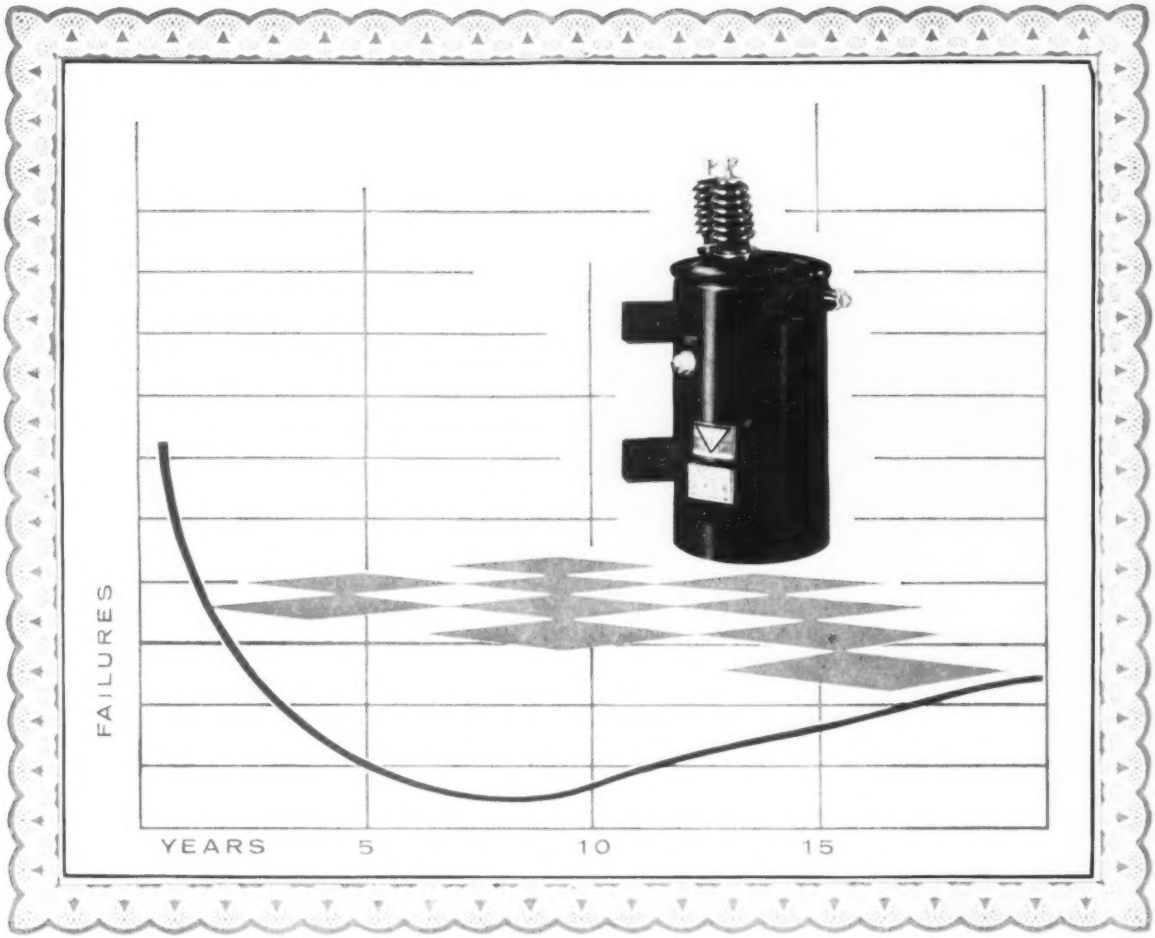
ELECTRICAL WEST

A McGRAW-HILL PUBLICATION

November 1959
50 Cents



Power From Niagara Rapids



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Pressure—Utility managements should gird themselves for an onslaught by housing developers demanding residential underground distribution systems "just like those described in the August issue of *House and Home* magazine." The fact that the article about a low-cost underground system near Chicago has technical inaccuracies and is based on some extremely optimistic premises will not make the sincere and conscientious developer any less vehement. After all, says the article, there would be *actual savings* if homes were installed with a washer and dryer on 70-ft lots. Most underground engineers will disagree.

It is apparent that the utility is using low-cost underground as a tool to bring about all-electric living. Also true is the fact that there appear to be actual cost and operating advantages inherent in underground systems for telephone service. True also is the fact that manufacturers are giving ever-increasing attention to underground power components and that underground costs, relative to the homes they serve, will continue to decrease.

As one underground engineer succinctly said: "Low-cost underground is like a low-cost Cadillac—expensive at best." For those who want it and those who can afford it, it is universally available.

Developers, however, must realize that it is a luxury and must be weighed against the third bathroom, the second Cadillac and the first swimming pool.

In the interest of the majority of power users, our utilities and utility commissions should stand fast on the principle of making premium underground service to a few carry its proportionate cost of service. This stand may not be welcomed by value-conscious developers, but the answer to this problem lies in a better job of economic education for them plus open-minded utility management willing to try new ideas that may lead to a progressive reduction in the "premium" for underground residential distribution.

New Residential Standard—The trouble with minimums is that they tend to become maximums under the stress of price competition. Home wiring has suffered from that paradox most of all. The result is a nation of underwired homes just barely up to the National Electrical Code of the time. Now at last comes a new American Standard for residential wiring that is considerably above the code and may provide the public with a bit more leeway for the growth of its electrical needs.

Far from being something new, it is the culmination of years of work by the Industry Committee on Interior Wiring Design. What is new about it is that it has been accepted by the American Standards Assn. as the American Standard Requirements for Residential Wiring. While the NECode is made mandatory through enactment of ordinances as a minimum safety standard, this new standard is one of adequacy and will have to be promoted and sold as such. But the selling should be much easier with such national prestige. The leagues and bureaus have been striving to sell adequate wiring and have often developed their own sets of standard recommendations. But the recognition as an American Standard gives them, the utilities and contractors a new tool with which to sell.

Metallic Crossarms 68

All Wiring Above Board 72

Home Economics Workshop . . 77

NELPA's Six-String Ensemble . . 87

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S. Established 1887

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CONTENTS

VOL. 123, No. 5 NOVEMBER 1959

Scientific Impact on Foreign Policy 59
Power Flows at Noxon Rapids by K. O. Strenge 61
Trim Power Transformer Costs 65
More Electrical Capacity for the Dollar by Charles Krieger 66
DC-8 Jet Engine Testing 70
Are Plastic Globes the Answer? 71
Correction Applications by Tom Hughes 73
Human Approach Leads to More Sales 80
NAED—Keys to Distribution 90
NWPPA Workshops—Power Use and Accounting 94

Cover—Another investor-owned hydro development goes on the line—Noxon Rapids, 40,000 kw. Photo by Washington Water Power Co.

DEPARTMENTS

Bulletins	31	News	100
Construction News	75	News Roundup	7
Editorials	1, 81	Product News	21
	Advertising Index	118, 119	

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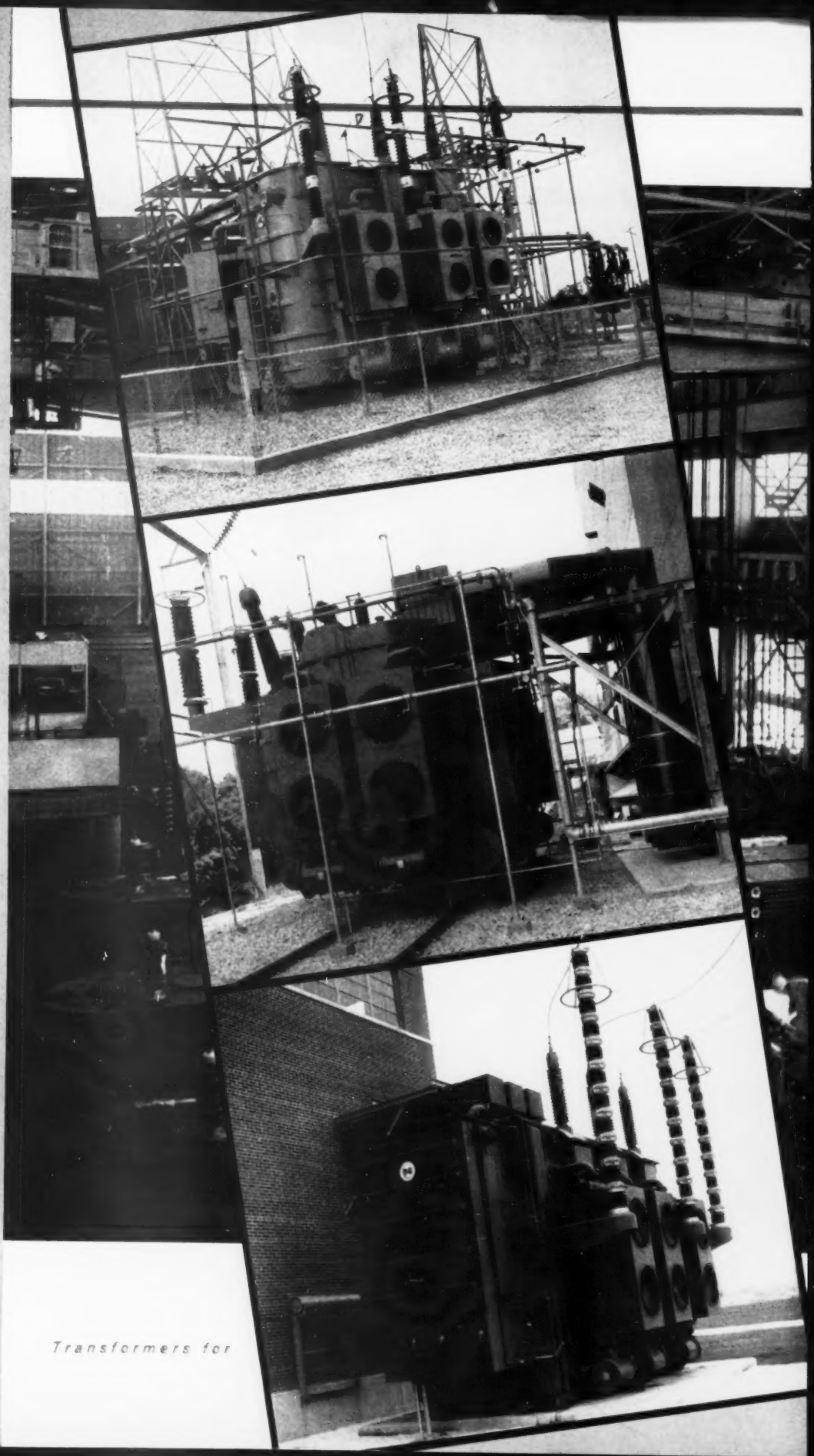
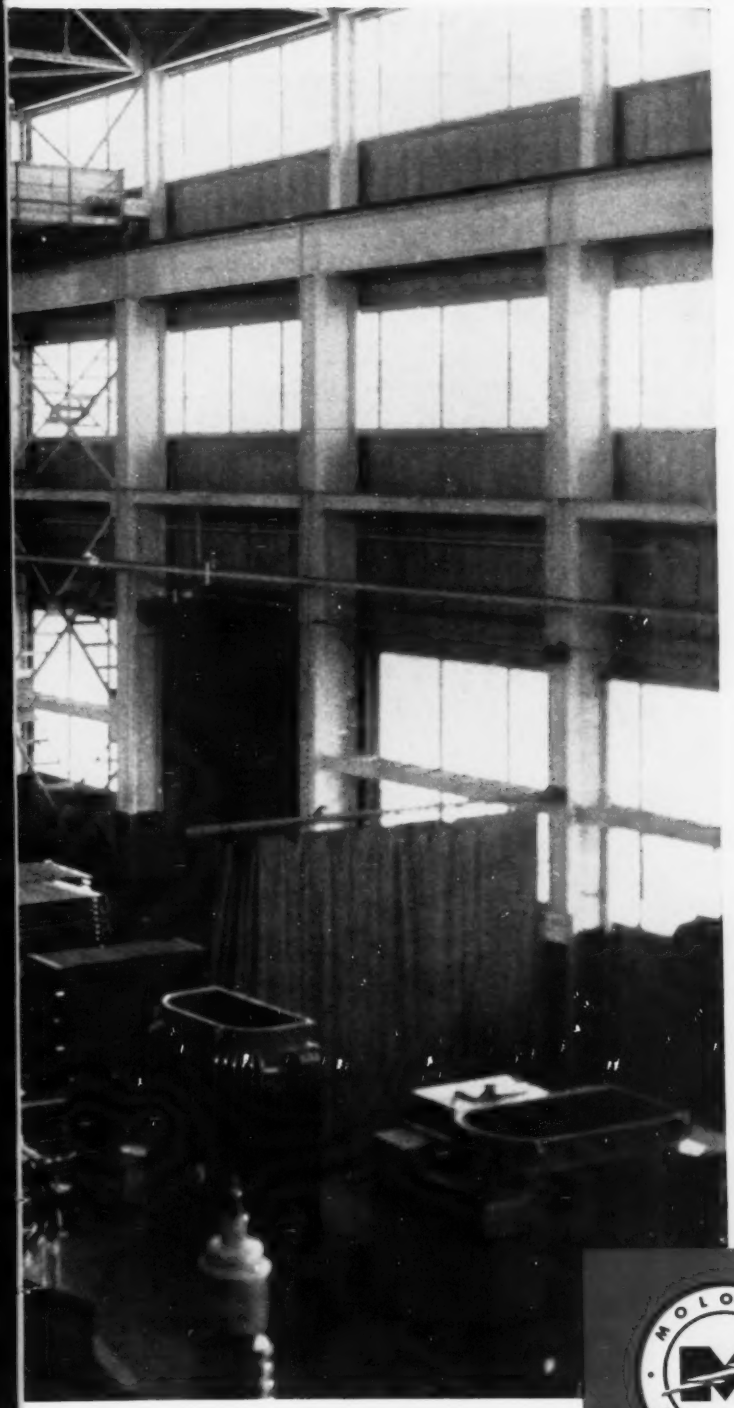


Transformers for

—THE NUMBER YOU PICK . . .



depends on carefully calculated system requirements of present and future loads. So too, must the manufacturer of power transformers be chosen, carefully . . . and with an eye to the future.

To this end, careful consideration of Moloney Electric Company's qualifications will reveal these facts:

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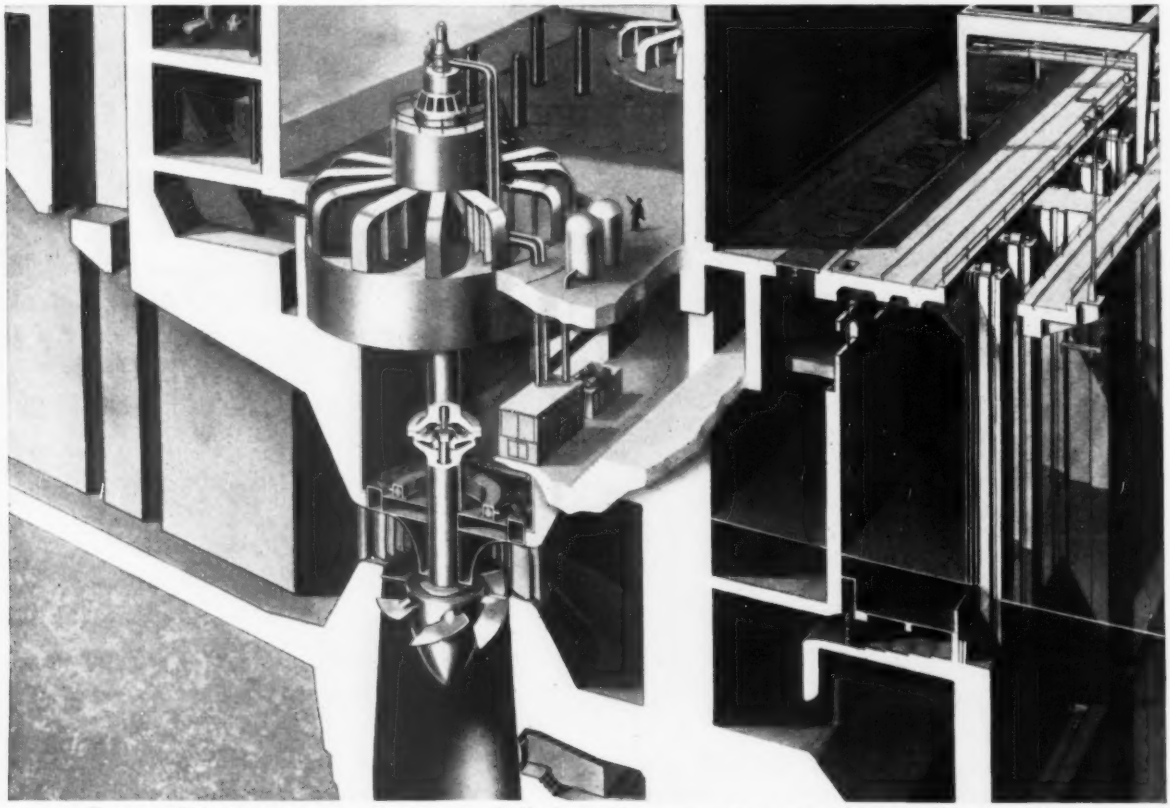
Pelton makes world's largest Kaplan turbine governors for The Dalles Dam

Of the 16 Kaplan turbine governors which Baldwin-Lima-Hamilton's Pelton Division is supplying for The Dalles Dam, located on the Columbia River, 14 are the largest ever built. Each has a wicketgate capacity of 950,000 ft.-lb. and a Kaplan blade capacity of 720,000 ft.-lb. In order to be absolutely certain that they will meet contract specifications in every respect, Pelton exhaustively tests these governors under simulated power plant conditions prior to installation.

In addition to governors, B-L-H is furnishing The Dalles Dam with 14 Kaplan type turbines, each rated to deliver 123,800 hp at 85.7 rpm under 81-ft. head. Station service units are also being produced for this project by B-L-H's Pelton Division. The Dalles Dam is thus a superb testimonial to Baldwin-Lima-Hamilton leadership in the design and manufacture of hydraulic turbines and related equipment.

For a copy of our newest illustrated bulletin, write B-L-H Corporation, Philadelphia 42, Pa., or Pelton Division (B-L-H), 2929 Nineteenth Street, San Francisco 10, Calif.

An inspection of one of the 16 Kaplan turbine governors for The Dalles Dam is made at B-L-H's Pelton Division.



Cutaway of The Dalles Dam powerhouse, where 16 Kaplan turbine governors built by Baldwin-Lima-Hamilton's Pelton Division and 14 Kaplan turbines built by the Eddystone Division of B-L-H are being installed. Artist's rendition courtesy of Portland District, Corps of Engineers, U.S. Army.

Pelton Division San Francisco, Calif.

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EW news roundup

BUSINESS FORECAST – McGraw-Hill economists predict that the steel strike has lasted long enough to make the pent-up demand for steel and steel products the dominating factor in the near-term business outlook. In fact, if, as and when steel is again being produced, the demands added to an already healthy economy might make a "roaring business boom in 1960." They warn that the upsurge might be so great as to involve the creation of a recession in 1961.

The federal government is doing its best to keep a tight rein on the supply of money and credit as a means of keeping a brake on the eager economy. Meanwhile consumer credit continues the sharp rise that began this spring. As of now the customers owe a record $48 billion and the repayment responsibility adds up to about 13% of the average income after taxes.

Despite tighter money, Johns-Manville's vice-president, W. R. Wilkinson, sees 1960 as another good construction year. J-M economists figure the total housing starts for '59 will be 1,380,000 and estimate that 1960 will add up to another 1,260,000 new starts. Also significant is the strong demand for the larger, higher priced home which is a reflection of rising personal income.

—EW—

TEMPER, TEMPER – Engineers of the Westinghouse Electric Corp. and the Public Service Electric & Gas Co. have taken a reading on the public's blood pressure during electrical service outage. Reporting at the Fall General Meeting of the AIEE, they charted a resentment profile which indicated that frequency, season, magnitude, duration and time of day all have a pronounced effect on the way the customer views the disturbance. For example, resentment rises rapidly after a six-hour outage and multiplies very rapidly after 24 hours. Outages between 6 p.m. and 11 p.m. cause two and a half times the daytime resentment. Outages in spring and fall are apparently less bothersome than those occurring in summer or winter. In fact, the loss of air conditioning causes twice the resentment but the loss of winter heating causes five times the resentment. One other fact—consumers resent more than one outage a year.

—EW—

TAKE-OVER–Electronic brains are displacing their human counterparts faster than many people believe. Here are some interesting observations in just the field of transportation.

Computers are making even air mail obsolete. Projects that formerly took 45 days to prepare by hand did not mind a two- or three-day dispatch by normal mail. Now that computers can do the same job in a few hours, a three- or four-day delay due to transmission seems like an anachronism that can only be remedied by further electronic brains which can transmit it in a matter of seconds–or by missiles which can cut the flight time into hours.

Dr. Dean Wooldridge, president of Thompson Ramo Wooldridge Inc., says that within three years electronic freeway traffic control systems can eliminate congestion and increase traffic flow. For example, monitors along the freeway would be able to diagnose trouble or anticipate congestion and flash signals to appropriate approaches that would warn drivers away from the snarl.

Nuts and Bolts in Sizes Seldom Seen

This partially completed group of turbine coupling nuts and bolts at Allis-Chalmers' York, Pa., Works is for use in the fabrication of seven 140,000-hp hydraulic turbines for the Chelan County Public Utility District's Rocky Reach hydroelectric project at Wenatchee, Wash. They range in size from 4¾ to 6¼ in. diameters

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And "featherbedding" may blow away also if the latest schemes of Union Switch & Signal Co. are put into practice. It seems like it's possible now to operate complete railroad systems without any train crews whatsoever. In fact, the time is so close that New Yorkers may be startled in the near future by noticing that their shuttle train between Grand Central and Times Square has neither motorman nor conductor.

—EW—

LIGHTNING RECORDER—Teinograph—if you haven't forgotten your Greek—you will recognize the name as stretched out writing. Anyway, that's the name of a new device developed by G-E engineers to record wave shapes of high voltage transients caused by lightning and switching surges on transmission lines. The instrument records the lightning surge in the sequence of Lichtenberg figure discharges, the envelope of which describes the wave shape. As the device requires no power supply, Cathode ray tubes or photographic film, it is much less expensive than oscillographs.

—EW—

Cornell University's follow-up on last June's engineering graduates indicates that the average starting pay was $530 per month, a range of $420 to $640. Physics grads led with an average of $570, with chemical engineers ($543), metallurgical engineers ($539), electrical engineers ($538) following in order of pay. The lowest group was the civils whose average monthly starting salary was $486.

—EW—

PRICE STRAWS—At least three companies had good news for purchasing agents last month. S&C Electric Co. has eliminated the price premiums on its 7.2- to 34.5-kv vertical-break and double-break outdoor three-pole interrupters which will reduce their prices as much as 20%. S&C's John Conrad said that the price reduction is due entirely to re-design for higher-volume production.

Sangamo Electric Co. has reduced the prices on its power capacitors approximately 20% in a move to re-align prices with manufacturing

costs and to accentuate the economics of supplying reactive power with capacitors rather than with generators.

—EW—

TAX FACTS – Northern States Power Co., whose president, Allen King, is also president of Edison Electric Institute this year, has come up with a tax booklet with a lot of impact. For example, NSP taxes are nearly two and a half times as great as the combined taxes of all of the REA cooperatives in the U. S., even though REA gross revenues are three and a half times as large as that one company's. NSP pays more than seven times the amount of taxes that are reported by TVA. Northern States Power taxes per kilowatt-hour are greater than the rate at which both the TVA and the U. S. Bureau of Reclamation sell wholesale power. And, finally, the taxes per share of NSP common stock are more than double the company's earnings per share after taxes. What price free enterprise?

—EW—

GIFTS–News releases come in cycles and this month the catch netted some free gifts for any Electrical West reader who cared to request them. For example, the Imperial Oil & Grease Co. at 6505 Wilshire Blvd. in Los Angeles has been giving away samples of its Molub-Alloy in small tubes that have proved to be exceptionally popular with sportsmen who have reels and guns to keep in shape. In fact, the sample has been so popular that the company is going to merchandise it. However, there is still time to get in on the free list before the product goes to market. Write the company.

Shure Brothers Inc. of 222 Hartrey Ave., Evanston, Ill., has come out with a booklet on microphones and how to use them. If you've ever had a mike blast, howl or rattle while addressing an audience or if your taping of TV programs isn't as you'd like it, this booklet will give you tips. Again free to our readers.

If you need a chuckle or two, write the Precision Equipment Co. at 4401 N. Ravenswood Ave., Chicago 40, for its new Laugh Book. It includes some famous cartoons as well as a compilation of "Heard in the Locker Room" jokes. Might come in handy the next time you're asked to address Rotary.

Speaking of laughs and the catch

SPECIAL ZINC-RICH COATING GIVES GALVANIC PROTECTION TO METALS

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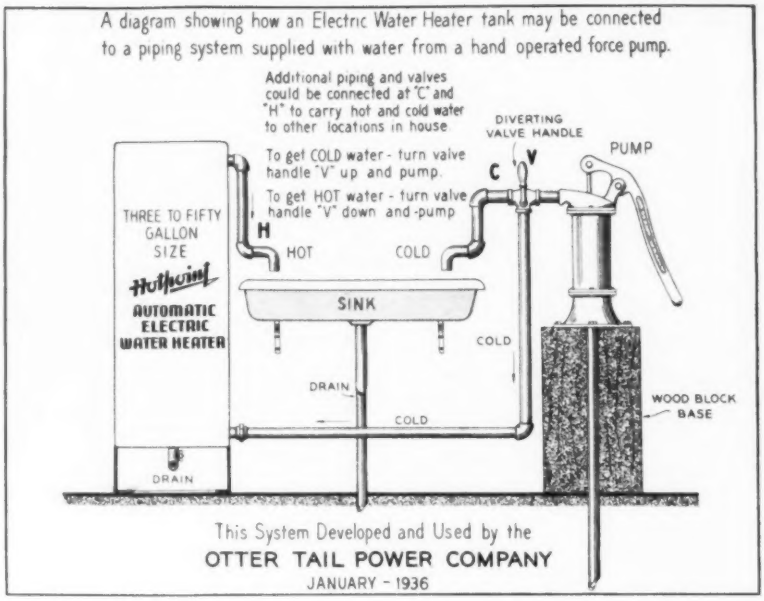
A diagram showing how an Electric Water Heater tank may be connected to a piping system supplied with water from a hand operated force pump.
Additional piping and valves could be connected at "C" and "H" to carry hot and cold water to other locations in house.
To get COLD water - turn valve handle "V" up and pump.
To get HOT water - turn valve handle "V" down and pump
DIVERTING VALVE HANDLE
PUMP
C
V
H
THREE TO FIFTY GALLON SIZE
Hotpoint
AUTOMATIC ELECTRIC WATER HEATER
HOT
COLD
SINK
COLD
DRAIN
COLD
WOOD BLOCK BASE
DRAIN
This System Developed and Used by the
OTTER TAIL POWER COMPANY
JANUARY - 1936

in the month's mail, take a look at the accompanying diagram for the recommended hot water system. And don't bet when this print was made. It's a system developed and used by a Middle West power company that has a large number of rural customers. The date, January 1936.

—EW—

WHITHER WEATHER?—Climate control has come in for a considerable amount of discussion during the past two months. At a recent meeting of the civil engineers in the East several prominent speakers talked about cloud seeding and artificial weather. The consensus seemed to be that cloud seeding not only is practical and economical but has been effective in certain areas of California and has produced precipitation far exceeding the cost of the process.

Up in Washington the State Department of Conservation & Development has declined to hold a state hearing on cloud-seeding activities sponsored by the Pacific Power & Light Co. in connection with its Lewis River projects. The hearing was requested by farmers and bulb growers who alleged that cloud seeding was responsible for an unusually heavy rainfall last spring.

Across the Cascades, the Washington Water Power Co. has been experimenting with cloud seeding for the past several years. This firm uses ground-based silver iodide generators and has not attempted aerial cloud seeding as yet. Results, according to WWP's Vice-president Marshall Blair, are still inconclusive.

Another weather note. The head of the Illinois State Meteorological Section of the Water Survey Division has reported that more rain falls in the center of an urban area than in sparsely settled districts nearby. A similar experience has been reported down in Oklahoma. Reasons for the phenomenon are not known but it is suspected that increased turbulence from local heating, greater mechanical mixing of air and greater concentration of condensation nuclei may give the city more rain than the suburbs.

—EW—

NEW APPLICATION – The rapid advances in thermoelectric heating and cooling have developed a new practical application—the air conditioned suit for the fighting man of the future. Under the thermoelectric principle, the direction of the electric current passing through small elements of solid semiconductor materials determines whether heat or cold will be produced. Thus, a fabric incorporating such materials could be extremely useful for both arctic or space conditions. Westinghouse engineers are working with the U. S. Navy to build the first experimental model of the garment.

—EW—

ANNIVERSARY – Oct. 21 marked the 80th anniversary of Edison's invention of the first commercially practical electric light bulb. Author

Republic ELECTRUNITE E.M.T. meets the challenge of change

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Republic ELECTRUNITE® E.M.T. meets this challenge. It provides for larger electrical raceways with greater load-building capacity built-in for tomorrow . . . at little or no extra cost.

Economical, too! ELECTRUNITE is lightweight, speeds handling, lowers installation cost. "INCH-MARKED"® in feet and inches on all popular sizes for fast, accurate measuring. Full length "GUIDE-LINE"® helps keep bends in the correct plane. Exclusive "INSIDE-KNURLING" with new SILVERSLICK finish makes wire pulling up to 37% easier.

ELECTRUNITE meets local, state, and national electrical codes, and carries the Underwriters' Laboratories Seal of Inspection.

To learn more about the advantages of Republic's ELECTRUNITE E.M.T., call your electrical distributor. Or, use coupon below and write direct.

REPUBLIC STEEL
STEEL AND TUBES DIVISION

REPUBLIC STEEL

Cleveland 8, Ohio

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION
DEPT. C-7676-A
216 EAST 131st STREET • CLEVELAND 8, OHIO

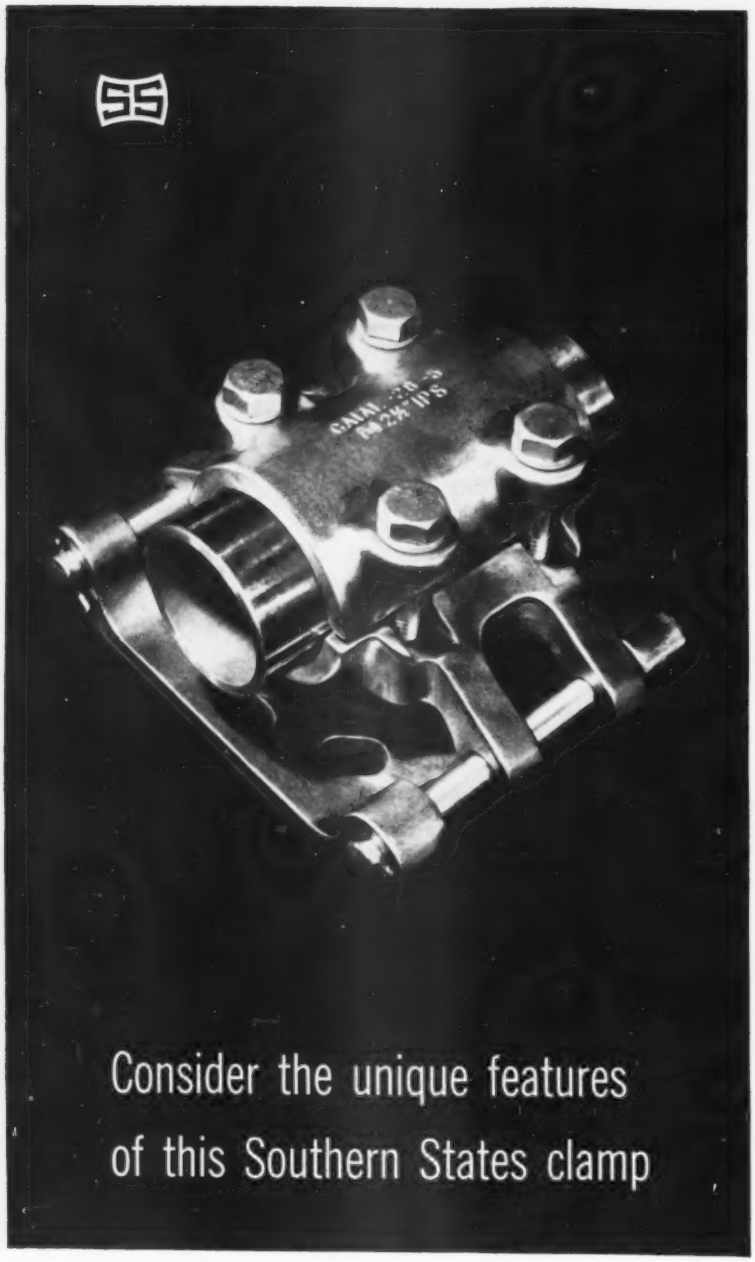
I want to learn more about Republic ELECTRUNITE E.M.T. Please send additional information.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____



This exclusive design offers many advantages in a sliding bus support clamp: two stainless steel excursion rods . . . wide support to provide high cantilever strength . . . movement in only one direction — no pivoting or side chatter . . . heat-treated, high strength aluminum . . . anodized bolts. The Type CAIAL is another example of Southern States engineering.

SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA Dominion Cutout Co., Ltd., Toronto

ities say that this one invention has probably touched the lives of more people more often and in more different ways than any other manufactured product in history.

Speaking of manufacturing, a Westinghouse Electric Corp.'s new production facility is capable of producing 32 million light bulbs per year in a completely automated process. Raw materials and complements are fed into one end of the 100-ft-long machine which spews out at the other end fully inspected, automatically packed and palletized cartons of bulbs—all without the aid of human hands.

—EW—

IMBALANCE – Felix Sparks, director of the Colorado Water Conservation Board, came up with an interesting observation last month. His analyses reveal that the United States is spending 50% more money overseas to build water projects for foreign nations than it is loaning to the citizens of the 17 Western states for the same purpose. Foreign aid for water development is costing the taxpayers $320 million this year but the domestic reclamation budget totals only $206 million.

—EW—

Here's another interesting government statistic. The government's wheat hoard totals 84 trillion calories—enough to add 24 billion pounds of weight. That's more than the whole population now weighs, and if you want to know how the calculation was made write the editor after Christmas.

—EW—

$3 MILLION—EEI announced last month that the budget for the Live Better Electrically program in 1960 will be boosted $¼ million to a $3 million outlay. The promotion package will include advertising in the major national magazines, two daytime TV shows and a TV spot schedule as well as a trade magazine program and a strong point-of-sale campaign for local utilities.

A $100,000 consumer contest will be announced in the fall similar to the present Light for Living Medallion Home Contest which closes Nov. 15. Prizes will be four Gold Medallion Homes.

DEAD END WITH

BLACKBURN

W6-2A from 6 Sol to 2 ACSR
This Clamp Will Handle All Popular Service Drop Wires

WEDGE CLAMPS

For Light Service
W6-4A
6 Sol to 4 ACSR

For Heavy Service
W2-OA
2 Sol to 1/0 ACSR

Conductor in contact with wedge for entire length of slider.

Removable aluminum slider allows installation without threading through clamp.

Drop wire can be pre-sagged and cut to exact length needed.

Can be attached to bare neutral at any point in the span.

Your Choice of 3 Bails

STANDARD **FLEXIBLE CAPTURED** **FLEXIBLE FREE**

JASPER
BLACKBURN
CORPORATION

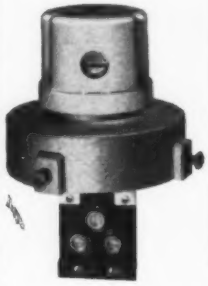
1525 WOODSON RD., ST. LOUIS 14, MO., WYdown 3-9430

Luminaire or slipfitter mounting, bases up to 3" diam. . . . Model 6600A. (For bases up to 3⅝" diam. . . . Model 6607A)

Pole or crossarm mounting . . . Model 6601A

Replacement plug-in for F-P Model S-64400 . . . Model 6604A. (Also, Model 6603A replacement for F-P Model S-64400GE.)

Ornamental pole top mounting . . . Model 6600A with S-485 adapter (adapter also available for poles with I. D. less than 3")



Bracket mounting . . . Model 6600A with S-487 clamp assembly.

FISHER-PIERCE 6600A PHOTOELECTRIC CONTROLS

no mounting problems here...

You can put Fisher-Pierce 6600A Series controls *into* service quickly, easily and safely in almost any location – and they'll *stay* in service for years of maintenance-free operation. *Directional operation* and *delayed circuit response* provide uniform turn-on, protection against accidental turn-off; *built-in expulsion-type arrestor* protects control against surges and lightning; *broad area hermetically sealed CdS cell* is pre-aged and 100% inspected against rigid specifications; *circuit design conservatively derates* all components; *twistlock plug, base dimensions and sealing means* conform to EEI-NEMA standard for twistlock adaptations; all Series 6600A controls are *unconditionally guaranteed for two years.*

For complete descriptive details, write for the 8-page Detailed Technical Bulletin, no. FP-830. The Fisher-Pierce Co., 43 Pearl St., So. Braintree 85, Mass.

FP

FISHER PIERCE

PHOTOELECTRIC LIGHTING CONTROLS

AN AFFILIATE OF SIGMA INSTRUMENTS, INC.

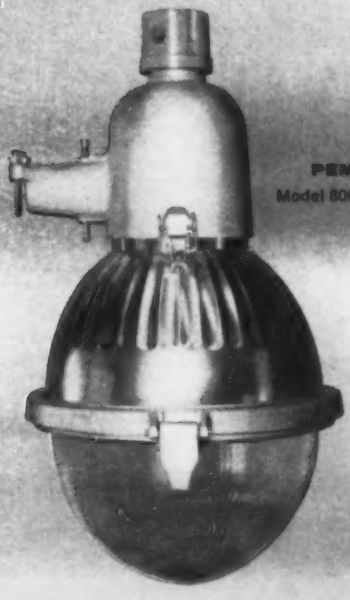
Type OV-25
with built-in ballast

WESTINGHOUSE

Type OV-10

Model 6600A
Actual Size

WHEELER
Crescent Luminaire



PEMCO
Model 800530H-06

JOSLYN
Model J152278C

A safe, long-lasting wiring system is a must for Colonial Williamsburg's Motor House and Cafeteria to safeguard valuable equipment and eliminate future costly repairs. For these reasons, the specifications called for the finest quality conduit. The choice . . . SPANG HD Galvanized Steel Conduit.

22 miles of SPANG Conduit give modern wiring protection for new buildings in *Colonial Williamsburg*

The magnificent restoration of Colonial Williamsburg turns back the clock 200 years. But The Motor House and Cafeteria, nearby, must be equipped to accommodate in 20th Century comfort their share of the 750,000 visitors each year.

22 MILES OF SPANG HD!

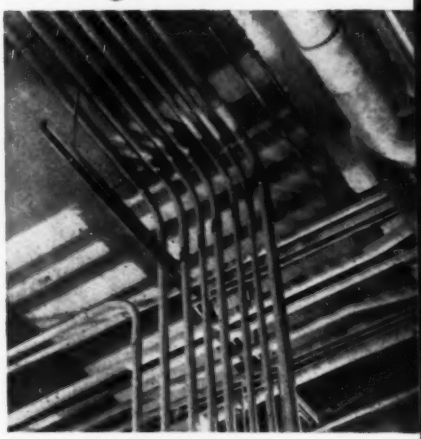
Helping in this task are 22 miles of SPANG HD Galvanized Steel Conduit, which carry the up-to-date wiring. Operated by this extensive system, which is designed for future expansion, are the all-electric kitchen, three 250 hp boilers, and the complete air conditioning system.

QUALITY IS THE KEY NOTE

In specifying materials, the question was not, "How much will it cost?" but rather, "How well will it serve?" SPANG Conduit was selected, because it met this requirement—by giving the maximum in performance and insuring the minimum in future "down-time."

YOU ALWAYS GET QUALITY WITH SPANG

If your wiring contracts require *top-quality* conduit, you'll get reliable installations with *quality-controlled* SPANG Steel Conduit. And your local SPANG Distributor will give you the good service you need.



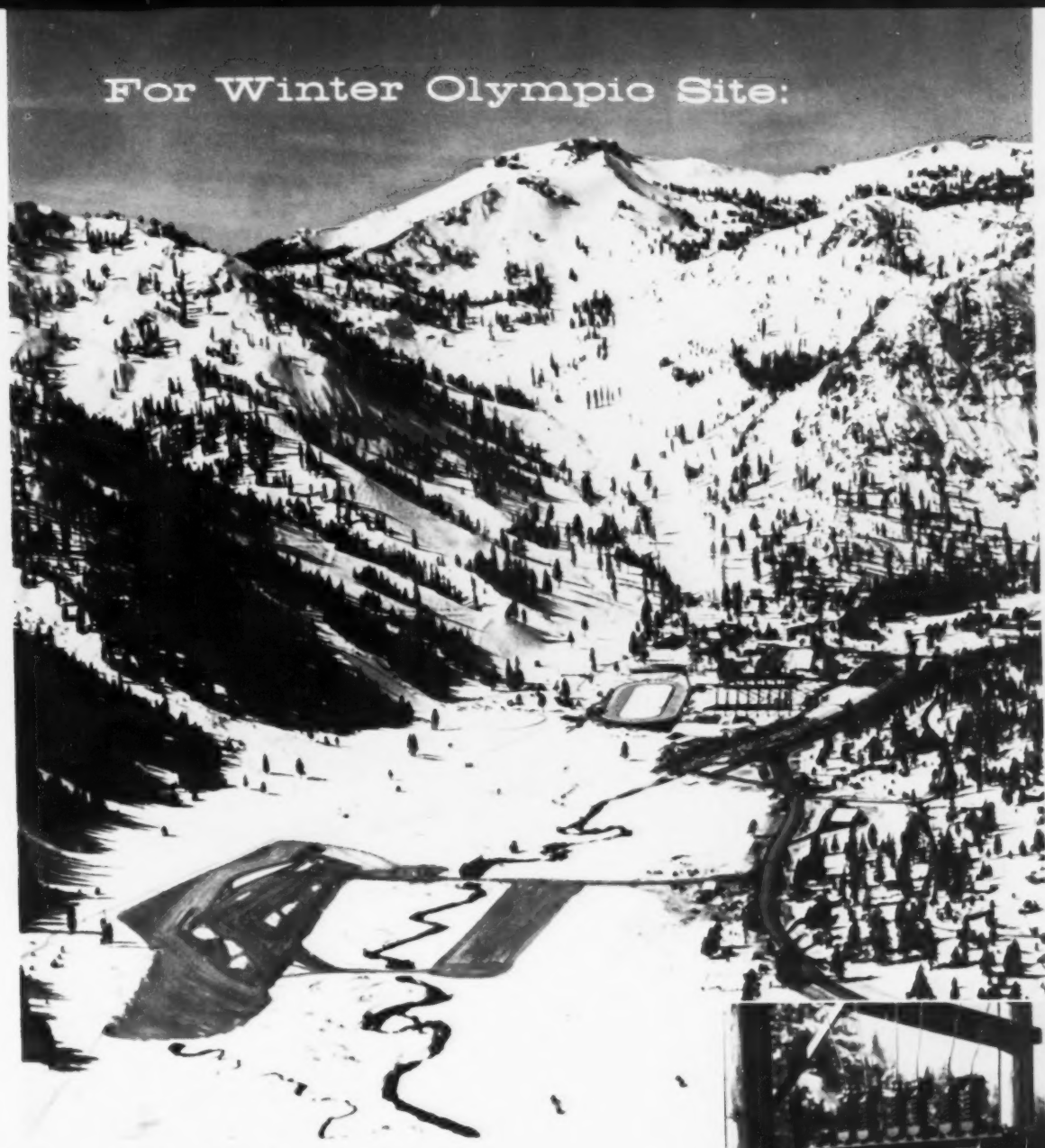
Architect: Colonial Williamsburg Architect's Office; consultant: Harrison & Ambrovitz, New York
Electrical Engineer: Wiley & Wilson, Richmond, Va.
Electrical Contractor: Chewning & Wilmer, Inc., Richmond, Va.
SPANG Distributor: General Electric Supply Co., Richmond, Va.

SPANG® CONDUIT

THE NATIONAL SUPPLY COMPANY

Subsidiary of Armco Steel Corporation

TWO GATEWAY CENTER, PITTSBURGH, PA.



New Allis-Chalmers 3-phase SFR Distribution Regulator

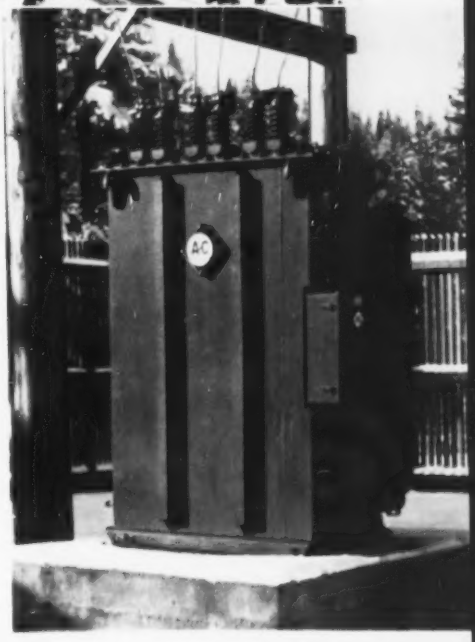
Workmen are busily putting the finishing touches on pastel-shaded dormitories, ski tows, ice rinks and, of course, the electrical system at Squaw Valley.

Here in a narrow, steep-sided valley high in the California Sierras will be held the Winter Olympics a short time from now.

The new, compact, weight-saving three-phase distribution regulator design by Allis-Chalmers was selected as the ideal solution to their voltage regulating problem.

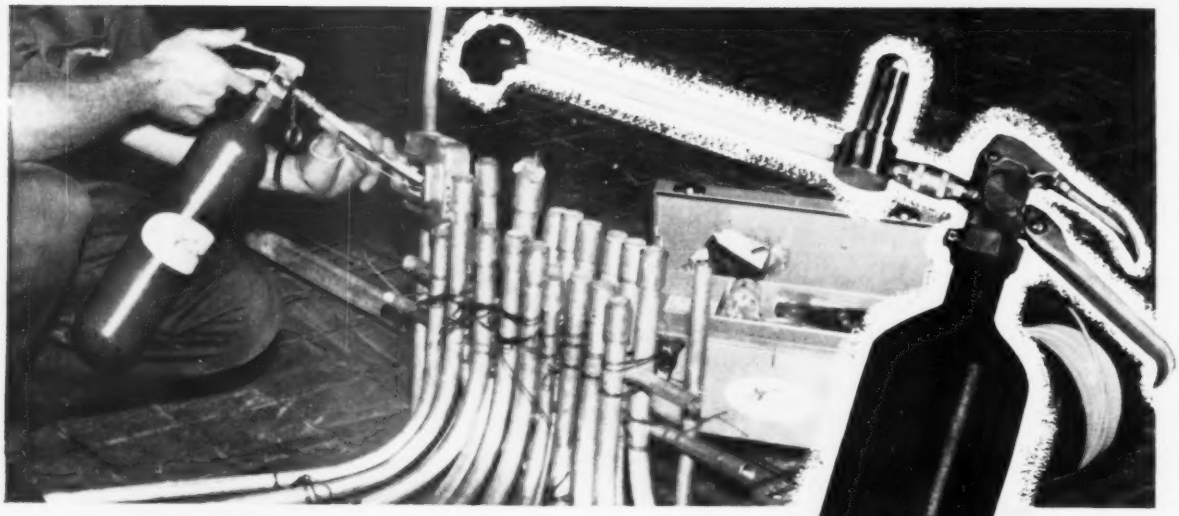
- These units save 33% space; cost 30% less per kva of 3-phase regulation; weigh 20% less; provide 160% *Vari-Amp* rating to 600 ampere maximum.

For help in revaluating your present substation planning, contact your nearby A-C office or Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.



ALLIS-CHALMERS

A-1150 E



NEW Jet Line Cylinder

*Pat. Pending on Entire Method and Apparatus

eliminates snaking in 1/2" and 3/4" conduit!

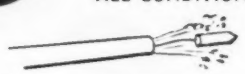
You can throw away your fish tape, because the new Jet Line Cylinder makes short work of wiring ½" and ¾" conduit . . . SAVES UP TO 70% of wire-pulling costs!

With the Jet Line Cylinder, you can lay a line through one . . . ten . . . even fifty conduits in a few minutes, regardless of lengths, bends, or loose obstructions! Just place a line package in the conduit and secure the free end of the line. Butt the Jet Line Cylinder seal-off assembly to the end of the conduit and activate the valve . . . tremendous pressure, unleashed by the expansion of a harmless gas, travels the lightweight line package through the entire length of the conduit in a split second! The strong nylon line, laid down by the speeding package, is used to draw polyethylene rope . . . then wire . . . through the conduit in minutes!

Completely safe, the Jet Line Cylinder uses no inflammable substances or explosives of any kind. Both the nylon line and polyethylene rope are non-conductors, so there's no danger in working hot panels.

The Jet Line Cylinder Kit can pay for itself on one or two jobs! Kit contains: cylinder with valve, pressure regulator, valve operating mechanism, and full pressure attachment with variable head. Cylinder can be refilled; spare cylinders available. Order your Jet Line Cylinder Kit today . . . forget fish tape forever!

★OPERATES UNDER ALL CONDITIONS

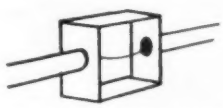


Water, sand, and mud are no obstacles for the Jet Line Cylinder! Package cannot become lodged in pipe — actually clears loose obstructions.

★USE IN ANY LENGTH ½" or ¾" CONDUIT

Sweeps through multiple bends, offsets . . . eliminates snaking in any length conduit. Jet Line Cylinder is economical to buy and use. Easy to handle . . . weighs only 9 lbs.

★CAN JUMP BOXES



In short runs when conduit openings are in line.

★USE AS A LINE LAUNCHER

Make a barrel with 2 ft. length of conduit . . . shoot line over rafters, through crawl space, etc.

OWN THE COMPLETE JET LINE SYSTEM*

Jet Line Cylinder for ½" and ¾" Conduit • Jet Line Gun for Conduit 1" or larger

You'll be prepared for all conduit wiring problems when you carry the complete Jet Line System . . . the Cylinder and the Gun.

SAFE, QUICK, SURE, the Jet Line System was invented by experienced electricians and has been thoroughly job tested. Compare the speed and simplicity of Jet Line with long hours spent in snaking . . . you'll count the time you save in dollars!

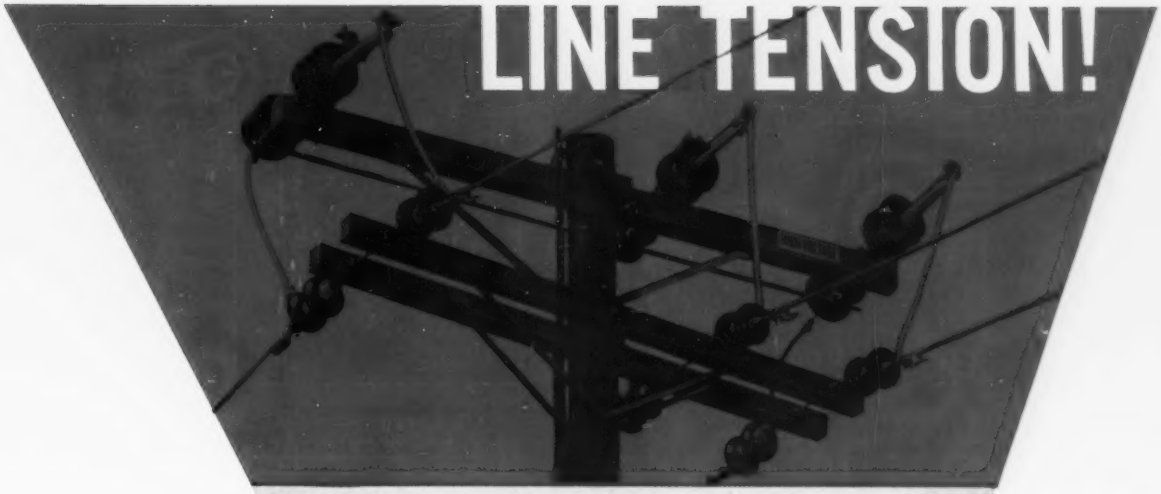
For complete information and prices, write your distributor or

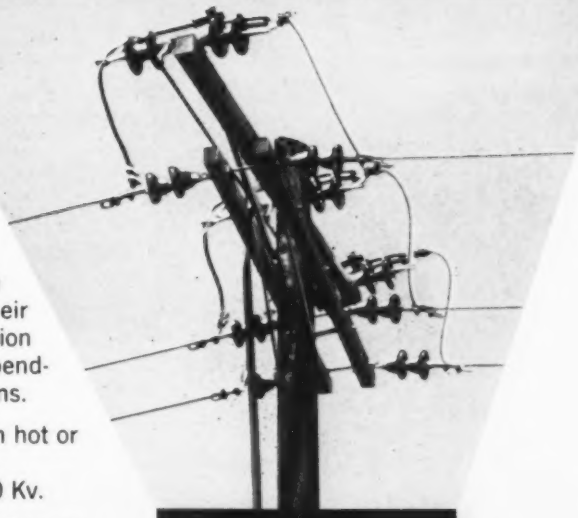
Jet Line Gun Company

730 Seigle Street, Charlotte, N. C.

4130

INSTALL KPF SWITCHES WITH OR WITHOUT LINE TENSION!





KPF air break switches operate equally well with or without conductor tension—tension is not necessary to their smooth functioning. Thus KPF switches may be installed on angle poles, major crossings or other locations where separate deadends are desired. Further, their simple design eliminates lubrication or maintenance, and insures dependability under all weather conditions.

KPF switches may be installed on hot or dead lines, and are available for common voltages from 7.5 to 110 Kv.

Test KPF switches with an installation on your own system. Inquire now!

KPF ELECTRIC COMPANY

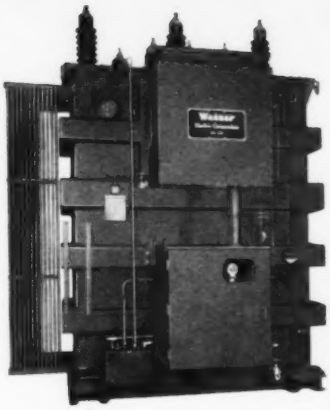
KPF
AIR BREAK SWITCHES
Standard for half a century

P.O. Box 1257W
Stockton, California
HOward 4-8381

8071

WAGNER LOAD TAP CHANGING TRANSFORMERS

offer new simplicity of design . . . new quietness of operation . . . new freedom from maintenance



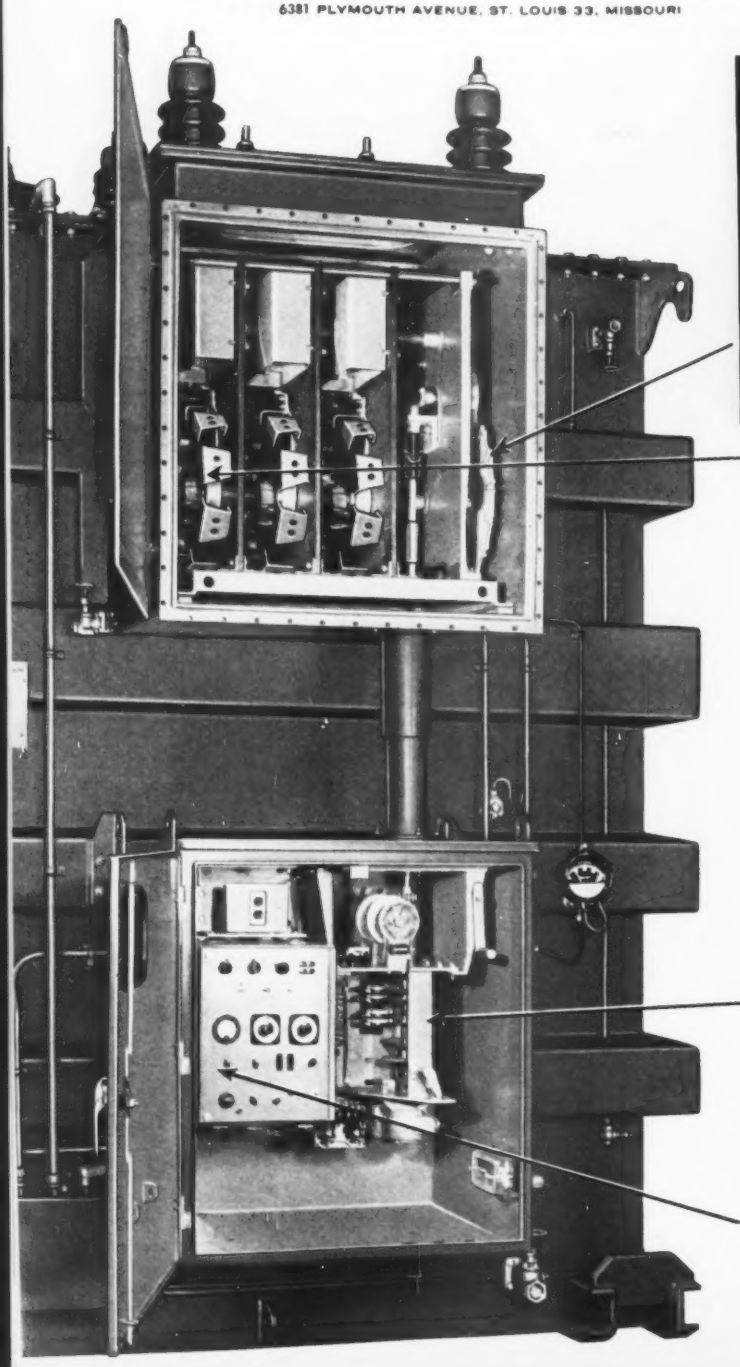
Here is a compact, extremely simple power transformer load tap changing mechanism, using a single drive shaft and one set of miter gears to assure quiet operation. Magnetic amplifier control means higher accuracy in the voltage sensing circuit, and greater reliability since no moving parts are necessary.

The design simplicity of the Wagner load tap changer . . . in the drive mechanism, the transmission assembly, the switches and the control circuit . . . results in long, efficient operating life with freedom from maintenance.

For full information on these Load Tap Changing Power Transformers, consult your nearby Wagner Sales Engineer. There are Wagner branches in 32 principal cities.

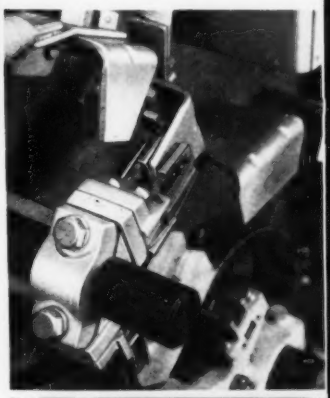
Wagner Electric Corporation

6381 PLYMOUTH AVENUE, ST. LOUIS 33, MISSOURI



ONLY 2 GENEVA GEARS

The two Geneva gears operate from a single drive pinion, and are designed for 90° entrance to reduce noise of operation. The reversing switch operates from a cam in the face of the tap selector gear which has a positive mechanical stop to prevent overtravel.

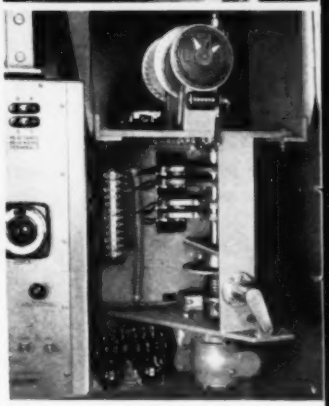


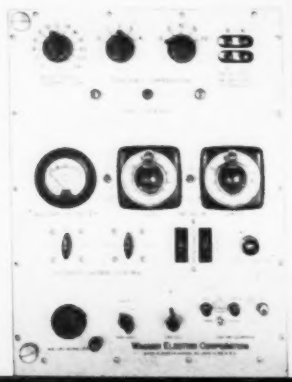
MAXIMUM LIFE CONTACTS

All switch contacts, both moving and stationary, are alloyed copper for maximum resistance to wear . . . reliability proved by life tests far exceeding normal operating conditions. Moving contacts self-aligning . . . free parallelogram action assures maximum contact area with constant pressure.

SINGLE SHAFT DRIVE

A single main drive shaft, geared to the drive motor and to the drive pinion, operates the tap selector switch and the load transfer switch. This shaft also operates the position locating switches and the position indicator.



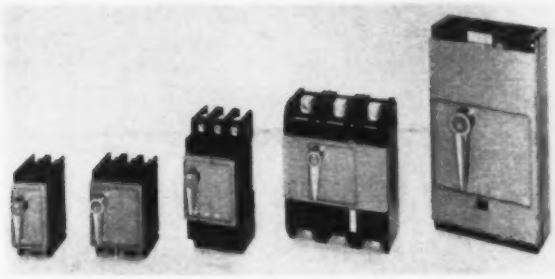


MAGNETIC AMPLIFIER CONTROL Magnetic amplifier control eliminates moving contacts in the voltage sensing circuit . . . provides simplified and highly accurate band width control.

WT59-14

PRODUCT NEWS

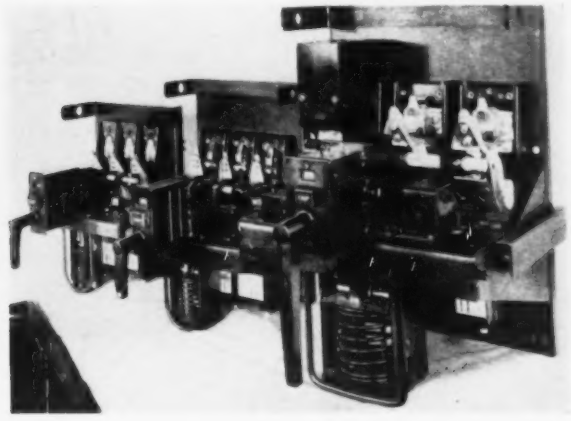
New Designs and Applications



Molded Case Circuit Breakers

(1) *Federal Pacific Electric Co., 50 Paris St., Newark 1, N. J.*

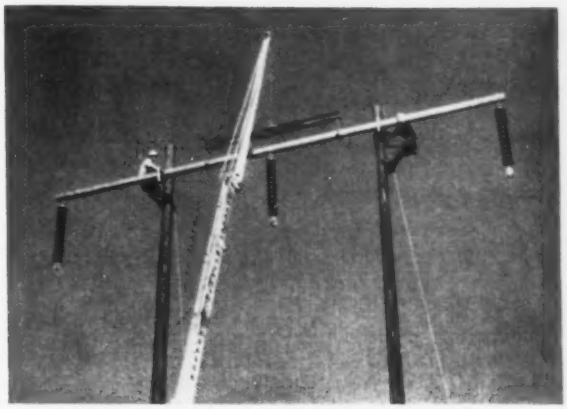
A new line of molded case circuit breakers featuring integral rotary handles is introduced by this manufacturer. With the operating handle an integral part of the breaker, external linkage is eliminated. The handle position is clearly visible from a distance and the mechanism has been designed to clearly indicate a center trip position. Included in the new line are 15- to 100-amp, 480-v, EF frame breakers, 15- to 225-amp, 600-v, F-frame breakers, 70- to 400-amp, 600-v, J-frame breakers and 125- to 800-amp, 600-v, M-frame breakers.



Circuit Breaker Mechanism

(2) *Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.*

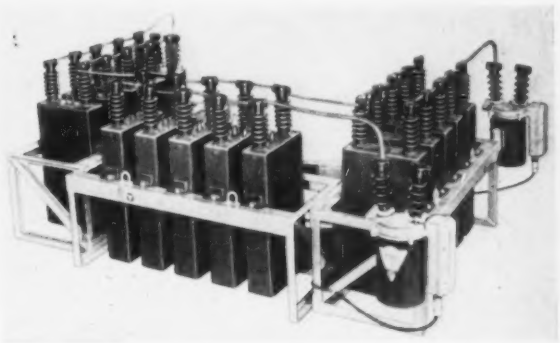
A new spring-actuated mechanism for closing low-voltage power circuit breakers offered by this company permits manually operated breakers to be used with selective or delayed tripping in applications involving fault currents of 50,000 amp and below. Energy required to close the breaker is stored when the operator turns the operating handle, compressing a spring. Speed and force of closing are independent of the force or speed with which the handle is operated.



Tubular Aluminum Crossarms

(3) *Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.*

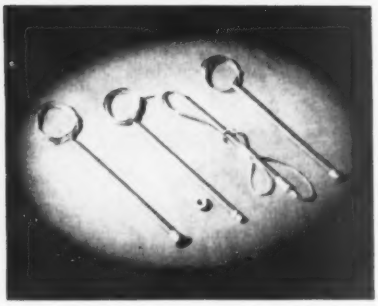
In a pioneering development on a 230-kv power line now under construction near Salem, Ore., Portland General Electric Co. is making the nation's first use of tubular aluminum crossarms on H-frame transmission towers. Included in the experiment are 41-ft tangent structure arms and 36- and 25-ft angle structure arms. The utility's examination of aluminum tubular crossarms is part of a program to develop maintenance-free structures for its service area.



Aluminum Capacitor Racks

(4) *Line Material Industries, McGraw-Edison Co., 700 W. Michigan, Milwaukee 1, Wis.*

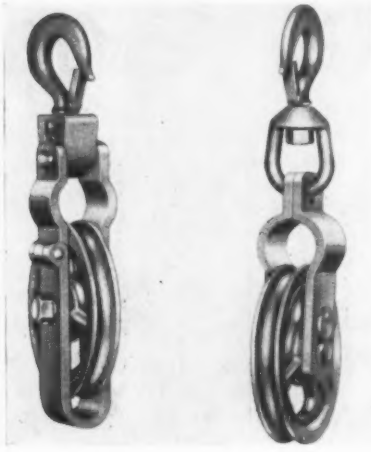
Single-row and cluster-type racks for 50-kvar capacitor units offered by this company are said to ease installation of pole-mounted capacitor tanks. Single-row racks can accommodate 300, 450 or 600 kvar, while cluster-type racks can accommodate 450, 600 or 750 kvar. They can be direct-pole mounted or pole-band mounted by means of an optional accessory. Both are fabricated of aluminum.



Fuse Link

(5) *General Electric Co., Schenectady 5, N. Y.*

A new cable-type universal fuse link that uses a removable button head has been introduced by this company for use with all modern open and enclosed distribution fuse cutouts. The new link will help simplify stocking and inventory control problems, according to the company. The new design is available in the EEI-NEMA K, KNT and T series and Hi-Surge series.



Wire-Stringing Block

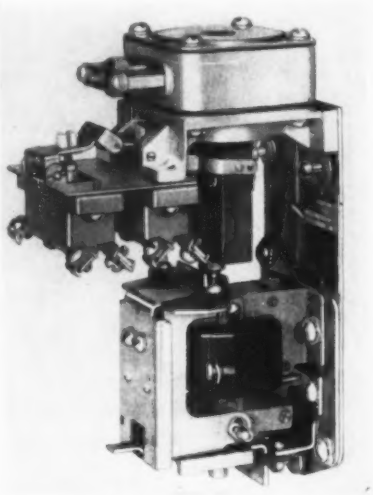
(6) *Sherman & Reilly Inc., First & Broad Sts., Chattanooga 2, Tenn.*

A new product of this company is a static wire stringing block. The sheave is dropped forged steel. Two types available are No. 9311 with full strap and safety locking head pin and No. 9611 with modified strap construction and sheave pin cam lock. Both types have articulated swivel safety hook and widened throat for passage of pulling connections and sleeve splices. Offered in various sizes for all types of static wire through $\frac{5}{8}$ in. diameter.

Photoelectric Control

(7) *Tabet Mfg. Co. Inc., Norfolk 12, Va.*

A new tubeless photoelectric control for outdoor use in controlling street and area lighting is available from this company. It is only 3 in. in diameter. A full-wave rectifier permits direct operation of the 1,000-w relay from the cadmium sulfide photo cell. A pin and jack assembly used to mount the cadmium sulfide cell permits easy replacement in the field. The device is available with modifications allowing it to be used as a replacement for older designs.



Timing Relay

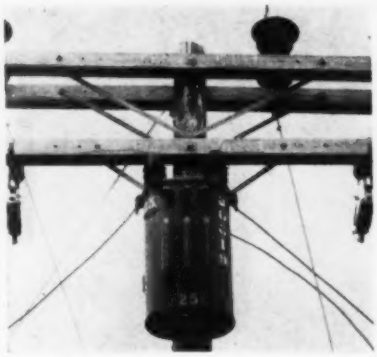
(8) *Square D Co., 4335 Valley Blvd., Los Angeles 32, Calif.*

An adjustable range pneumatic timing relay with two normally open and two normally closed time contacts is now available from this company. Two single-pole, double-throw snap switches are used for the timing contacts and each can be separately adjusted to provide a definite timing sequence. One snap switch can be set to operate before the other. Timing range is adjustable from .2 second to three minutes. Available for either a-c or d-c operation.

Gas Puller

(9) *Jet Line Gun Co., 730 Seigle St., Charlotte, N. C.*

This new conduit wire puller utilizes the expansion of a harmless gas to propel a lightweight line package through conduit. Laying a strong nylon line behind it, the package travels the entire length of conduit in a split second regardless of distance, bends or obstructions, according to the manufacturer. The nylon line is used to pull polyethylene rope, then wire through the pipe. It can be used in $\frac{1}{2}$- and $\frac{3}{4}$-in. conduit. The gas is contained in a cylinder that is portable.

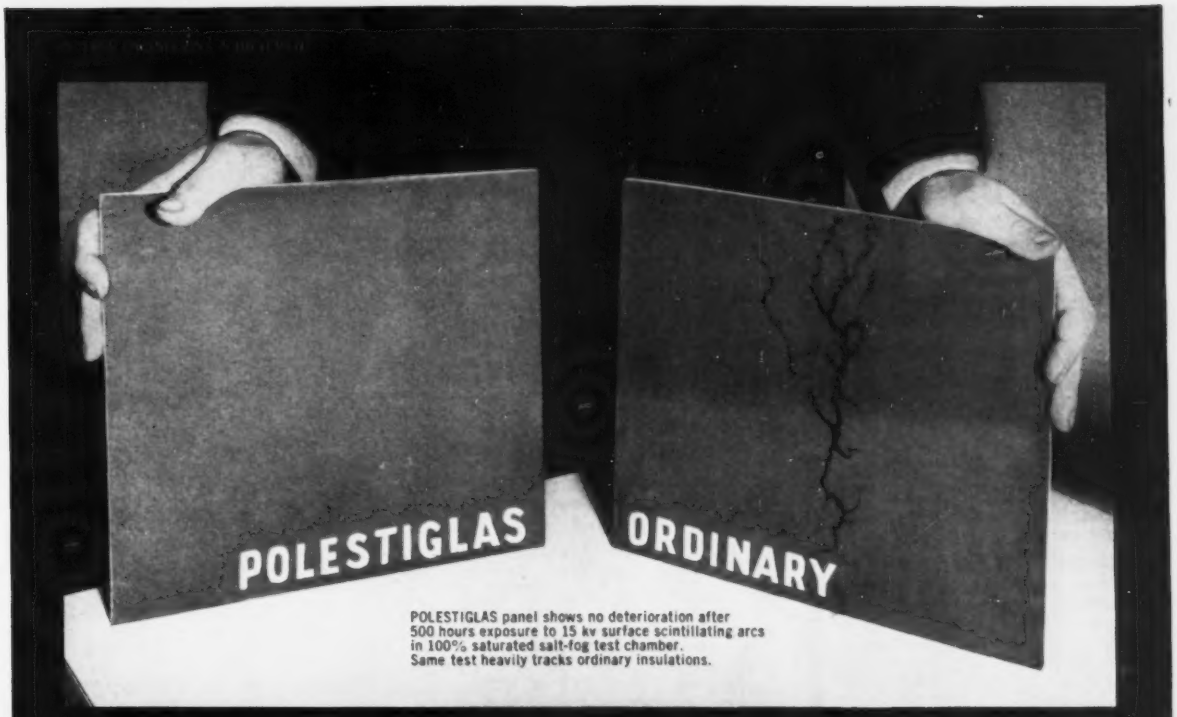


Evaluation tests on a new plastic-coated transformer are being conducted by Line Material Industries. Designed for use in coastal areas, the new product consists of a conventional L-M distribution transformer with a special corrosion-resistant plastic finish. The company reports that it has successfully completed exposure tests of one year in Ohio and Florida. Pictured is a trial installation on the system of Pacific Gas and Electric Co. in California

Soil Tester

(10) *A. B. Chance Co., Centralia, Mo.*

A new device for testing soil conditions before an anchor is installed is now offered by this company. The probe is a 5-ft rod with a screw-type head. It is screwed into the ground to the depth the anchor will be installed with a special wrench equipped with a torque scale. Torque readings are translated into soil classifications, using a conversion table that is fitted into the flap of the tool's carrying bag.



POLESTIGLAS panel shows no deterioration after 500 hours exposure to 15 kv surface scintillating arcs in 100% saturated salt-fog test chamber. Same test heavily tracks ordinary insulations.

FEDERAL PACIFIC ANNOUNCES...

POLESTIGLAS*

IMPROVED INSULATION FOR METAL-CLAD SWITCHGEAR RESISTS TRACKING... GIVES NEW PROTECTION IN HIGH HUMIDITY AND CONTAMINATED AIR!

Integral casting of POLESTIGLAS (right) assures uniform bus insulation and eliminates hand-wrapped bonds and offsets. Insulation is bonded to the bus bar to give void-free construction resulting in low corona loss.

Po·les·ti·glas...a cast or molded glass reinforced polyester...Provides superior insulation for metal-clad switchgear...Licks "problem" installations too tough for conventional insulation...Proves best insulation for use in areas of high humidity and contaminated atmosphere. **TEST RESULTS SHOW:** ■ Superior resistance to tracking ■ Reduced moisture absorption ■ Low, stable power factor in high humidity ■ Greater flame retardance ■ Low corona loss ■ High dielectric and impact strength. POLESTIGLAS ...another engineering achievement in Federal Pacific's program to better serve utilities and industry. Write for Bulletin 6025, Federal Pacific Electric Company, General Offices: Department 374, Newark 1, New Jersey. *Trademark of Federal Pacific Electric Company

FPE **FEDERAL PACIFIC ELECTRIC COMPANY**

The Best in Electrical Distribution and Control Equipment

For phone number of closest representative see advertising index in back of book.

ONLY EDWARDS MAKES A COMPLETE LINE of signaling products for control, communication and protection.

SOLD ONLY THROUGH ELECTRICAL DISTRIBUTORS (with these complete sales programs from Edwards for their use)*

- "sound partnership program"
- "industrial modernization"
- "product information"

(*endorsed and supported by national and regional distributor and contractor associations)

INSTALLED BY ELECTRICAL CONTRACTORS who prefer Edwards 4 to 1 for simplicity and quality that means quicker installations, no callbacks.

BACKED-UP BY EDWARDS TECHNICAL SPECIALISTS in 98 cities who work with distributor, contractor, architect and engineer.

TEAM-UP WITH EDWARDS Ask your local Edwards representative how modern signaling (clock systems, fire alarms, drop and lamp annunciators, audible signals, etc.) can benefit you, or write Edwards Company, Inc., Norwalk, Connecticut. (In Canada: Edwards of Canada, Ltd, Owen Sound, Ontario.)

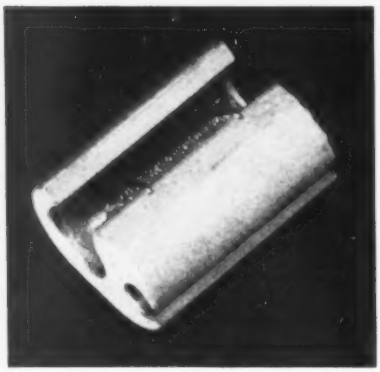
DO BUSINESS WITH THE TEAM THAT'S SETTING RECORDS

EDWARDS

Oscillating Hydraulic Derrick

(11) *McCabe-Powers Body Co., 5900 N. Broadway, St. Louis 15, Mo.*

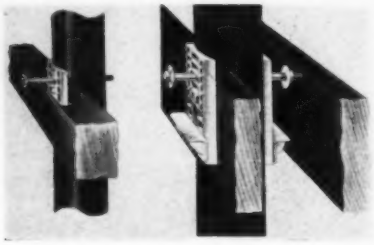
This company has announced the addition of an oscillating hydraulic derrick to its line of fully powered derricks. The new unit has a vertical operating arc of more than 200°, extending from the stowed position above the body to just above the ground. The head sheave can be spotted at any point in this arc. It can also be moved horizontally at any angle of elevation to any point in a 180° arc. It can be used with the firm's series DF-1 hydraulic digger. When not in use the digger swings out of the way or can be locked in a stowage bracket on the derrick.



Parallel Groove Connectors

(12) *Anderson Electric Corp., 700 N. 44th St., Birmingham, Ala.*

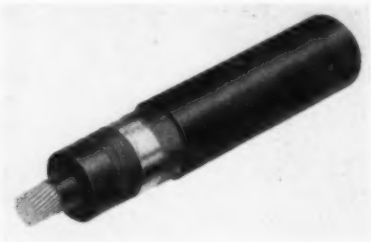
A new line of extruded aluminum parallel groove connectors is announced by this company. A new feature is found in the stainless steel clips that snap on to the main conductor and hold the fitting in place while a tap is made. This provides faster, safer installation and allows for hot as well as cold installation. The connectors are available in sizes to cover cable ranges from No. 6 solid to 4/0 ACSR. All are pre-inhibited and come individually packaged in polyethylene bags.



Crossarm Gains

(13) *Malleable Iron Fittings Co., Branford, Conn.*

This company is offering new adjustable crossarm gains for use on single or double dimension arm H-frame structures. An easily adjustable shelf will accept crossarms from 7 in. through 12 in. high. Both wood contacting surfaces have integral teeth that grip the pole or dimension crossarm. No cut gain on the pole is necessary.

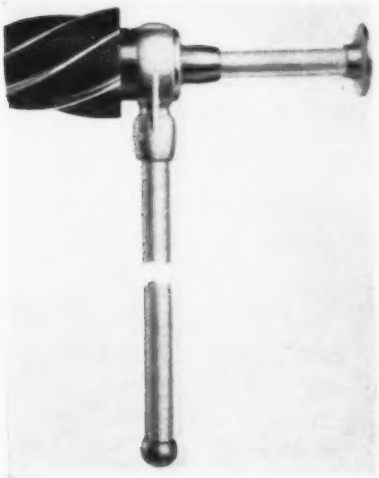


Power Cable

(14) *National Electric Division, H. K. Porter Co. Inc., Porter Bldg., Pittsburgh 19, Pa.*

A new 28-kv power cable with 33/64-in.-thick butyl rubber insulation has been developed by this manufacturer. It is designed for application in generating stations and distribution substations. It is most commonly used as primary lead cables for generators, transformers and other distribution equipment. It has a neoprene outer jacket.

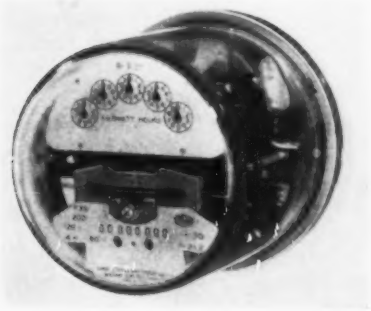
For Bulletins Use Coupon Page 31



Conduit Hand Reamer

(15) *Ridge Tool Co., Elyria, Ohio*

This new rachet handle, hand-operated conduit reamer quickly smooths inside edges of 3½-in. to 4-in. conduit. The hand grip has a large pressure plate for application of body pressure when necessary. The hardened tool steel cone is removable for sharpening.



Three-Stator Meter

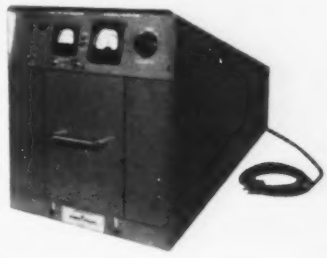
(16) *Sangamo Electric Co., 11th & Converse, Springfield, Ill.*

This company announces production of a three-stator meter with full 200-amp capacity. A 50% reduction in price has been announced with the introduction of the meter and applies to the class 100 and class 10 ratings as well as to the class 200. The company reports that it results in a cost reduction of 85¢/kva of meter capacity. The single disc round design of the meter cuts both weight and volume by 50%. It is furnished in both socket mounting and bottom connected models.

We're not sure just what an exact, international, standard foot-candle is. (That Japanese trainman's lantern up there might be it for all we know.)* What we do know is that when you can set every last photoelectric control in your system to turn on at the *same* light level—by using *one* calibration source—then you've got something. Standardization is then not a question of digging up 3.1416 foot-candles somewhere, but successfully getting the whole street-lighting system to work at the light level you want it to—or according to a desired burning hour schedule.

The solution we offer is the Series 6100 Calibrator. It will do the job accurately and quickly and costs less than comparable types or what you'd probably spend building one yourself. The Calibrator is small enough to sit on a bench or be carried around. The most important parts are a pair of Weston photocells matched to a microammeter that reads in foot-candles. A choice of five interchangeable "front doors" takes care of all control mounting styles you may have.

This calibration box also helps pay its way in acceptance testing of controls, recalibration after repair and basic troubleshooting. We've used a number of them in our own plant for some time now, to calibrate several thousand controls.



The price of the 6100 is about $400. A bulletin is available on request. The Fisher-Pierce Co., 43 Pearl Street, So. Braintree 85, Mass.

*Liberated in 1945 by an F-P engineer.

FP
FISHER PIERCE
PHOTOELECTRIC LIGHTING CONTROLS
AN AFFILIATE OF SIGMA INSTRUMENTS, INC.

CROUSE/HINDS

Condulet®
electrical equipment

the one complete line for corrosive locations

Photo shows Feraloy Condulet conduit fitting after several years exposure to hydrochloric acid. Note extreme deterioration of conduit.

RESISTS chemical and galvanic corrosion

RESISTS acids, alkalis, salts

RESISTS varying concentrations and temperatures of corrosive liquids, vapors, gases, dusts

Corrosion problems would be simple if there were a single material which would resist all corrosive substances.

Since there is not, Crouse-Hinds provides electrical equipment in four materials which offer a selection to meet virtually every known corrosion problem . . .

FERALOY® features the desirable characteristics of cast iron: strength, corrosion resistance, versatility, adaptability, economy. Plated with zinc and cadmium, Feraloy Condulets will combat most corrosive elements.

ALUMINUM ALLOY develops its own self-repairing oxide film which resists a number of corrosive conditions. Copper-free Aluminum Alloy Condulets effectively resist galvanic corrosion.

PLAST-A-COAT, a polyvinyl chloride, is a resilient coating which withstands abrasion and repels corrosion from caustics, alkalis and heavy mineral acids. Tough, non-peeling, it also acts as an insulator.

SILICON BRONZE, when all other materials fail, can be furnished for the most extreme corrosion problems. Counteracts virtually all alkalis as well as salt water, sulfur gases, etc.

CROUSE HINDS
SYRACUSE NEW YORK

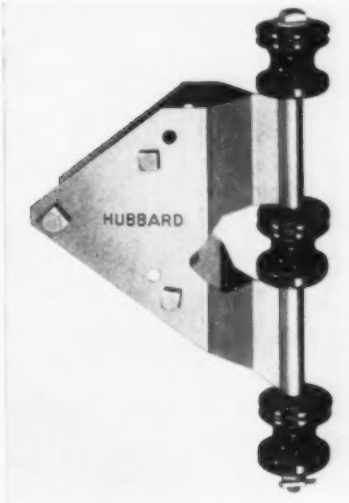
Write for **BULLETIN #2699** containing full information on Crouse/Hinds Condulets for Corrosive Locations.

Offices: Atlanta, Baton Rouge, Birmingham, Boston, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Corpus Christi, Dallas, Denver, Detroit, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Oregon, St. Louis, St. Paul, Salt Lake City, San Francisco, Seattle, Tulsa, Washington. **Resident Representatives:** Albany, Baltimore, Reading, Pa., Richmond, Va.

Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

Crouse-Hinds Instrument Company, Inc., Silver Spring, Md.

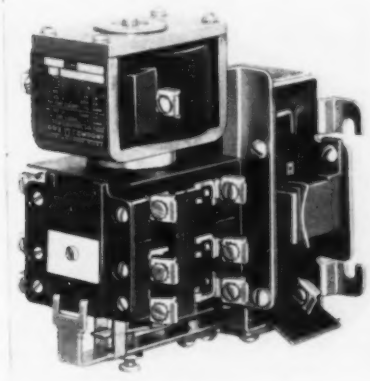
For phone number of closest representative see advertising index in back of book.



Secondary Rack

(17) *Hubbard & Co.*, 200 S. *Michigan Ave., Chicago* 4, *Ill.*

A secondary rack that is mounted to the end of a crossarm to conserve pole space is offered by this company. The end of arm rack also permits the use of a shorter pole than would normally be required for joint construction clearances where secondary services are taken from a rack on the pole. It is available for three or four conductors.



D-C Relay

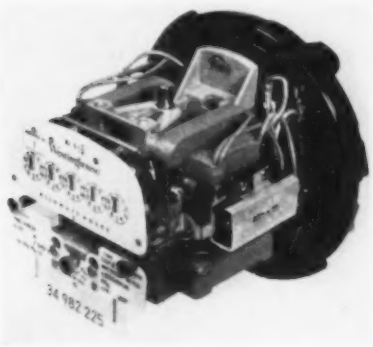
(18) *Square D Co.*, 4335 *Valley Blvd., Los Angeles* 32, *Calif.*

A new mechanically held d-c relay has been added to this company's line of type D relays for a-c and d-c pilot control. The new mechanically held attachment mounts in the same manner and space as an a-c attachment. The standard type D electrically d-c relay mounts directly on the attachment, and d-c coils are available in a variety of voltages.

Portable Generator

(19) *Empire Corp.*, 1566 *S. 83d St., Milwaukee, Wis.*

This company announced a new portable generator that is powered by a lightweight Briggs & Stratton Model 14 gasoline engine. The generator set is rated as 2,500 w, 120 v, 60 cycles at 3,600 rpm. Over-all dimensions are 28 in. long by 17 in. high and 17½ in. wide. It is reported to be 20% lighter (it weighs 127 lb) and the price had been reduced 10.5%. The horsepower of the engine is increased 8.7%.



Polyphase Meters

(20) *Westinghouse Electric Corp., Meter Department, Rawleigh, N. C.*

A new line of 120-, 240- and 480-v polyphase watt-hour meters is announced by this company. It includes improved designs for all types previously available plus a universal meter for 120-, 240- and 277-v circuits. The universal meter has a dual rating voltage coil and a series parallel switching device. It can be used on both 120- and 240-v circuits without recalibration.

Floor Insert Heater

(21) *Electromode Division, Commercial Controls Corp.*, 570 *Culver Rd., Rochester* 3, *N. Y.*

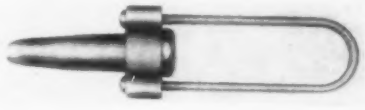
A new floor insert electric heater offered by this company makes it possible to have heat where other types cannot be mounted. Model FI-4 is 14 1/8 in. long, has a capacity of 400 w and model FI-8 is 30 1/8 in. long and has a capacity of 800 w. Both are 6 1/16 in. wide and 8¼ in. deep and operate on 120 or 240 v.

For more information fill in coupon . . . p 31

Control Mounting Bracket

(22) *Ripley Co., Inc.*, 1 *Factory St., Middletown, Conn.*

This company announces a new addition to its line of street lighting control equipment. It is said to be adaptable to any photoelectric street light control mounting arrangement where mounting directly to the luminaire head is not practical. It is ⅛-in. hot-dipped galvanized steel. The bracket contains prewired leads for connection to line load and neutral lighting circuits. The plug assembly is protected with a neoprene jacket.



Automatic Dead-end

(23) *Fargo Mfg. Co. Inc.*, 845 *Main St., Poughkeepsie, N. Y.*

This company announces availability of a new automatic dead-end for all standard sizes of Alumoweld, aluminum clad steel messenger, static wire or guy strand. The company reports that the dead-end maintains 95% or better of the strength of Alumoweld with extra-long aluminum jaws. It is designed to hold on to the aluminum coating of the conductor and not puncture through to the steel. The devices are available from Line Materials Industries.

Out of Your Investment in Westinghouse Research Came a Great Advance in Network Transformers . . .

IN 1956 Westinghouse introduced the revolutionary Space-Miser network transformer—a compact design, 20% lighter in weight, that enabled utilities to save 15% in vault space for a given kva rating.

IN 1957 the Space-Miser design established itself as pacesetter of the industry.

IN 1958 as the rest of the industry rushed to match the new standards in economy, reliability and maintenance made possible by this new unit, Westinghouse extended Space-Miser design to the full range of EEI-NEMA ratings.

IN 1959 Westinghouse has continued to set the pace with refinements in Space-Miser tank design and by adding the exclusive Insuldur* insulation system.

FOR OVER THREE YEARS Space-Miser design has set the pace for industry progress with resulting benefit for every utility network system. This is a clear-cut example of how electric utilities' dollars, spent with Westinghouse, have reaped research and development dividends in increasingly efficient equipment.

For more information, contact your Westinghouse representative . . . or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-70903

*Trade-Mark

SPACE MISER the network transformer that changed the thinking of an industry

SPACE-MISER NETWORK TRANSFORMERS changed industry thinking in . . .

Maintenance Savings—Smooth-Form tank and Yukon coolers permit more uniform finish, simplify inspection and repainting, and reduce collection of corrosive deposits.

Installation Savings—Small size and light weight make handling easier, faster, safer. Required vault space is smaller. In addition, low height permits off-the-floor mounting without extra-cost excessive vault depth.

Improved Reliability—Insuldur insulation system permits 10° more overload temperature without additional loss of insulation life. Other features which boost reliability include superior design bushings, rotary disconnect and grounding switch and easily accessible high-voltage terminal chamber.

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

ONLY ONE **HIGHEST**

The highest mountain on the North American continent is Mount McKinley in our 49th State, Alaska. It towers 20,300 feet above sea level and rises higher above the surrounding country than any other mountain in the world. Bronco 66 Certified is first choice for use in these freezing, rocky heights because the high Neoprene content in the jacket gives it unexcelled flexibility in cold weather as well as maximum abrasion resistance.

BRONCO 66 CERTIFIED (67.32%) NEOPRENE

BRONCO *Certified* **66** NEOPRENE

PORTABLE ELECTRICAL CORD AND CABLE

has the

HIGHEST NEOPRENE

content in the industry

. . . at no extra cost. Outer protecting jacket contains not less than 67.32% Neoprene and is so certified by a Registered Professional Engineer. When you buy Bronco 66 Certified, you get the most Neoprene for your money . . . hence, maximum protection from oil, acids, alkalis, heat, cold, flame. Always specify Bronco 66 Certified and enjoy the long term economy of top quality.

Self-measuring jacket is branded every two feet by a patented Bronco process—U. S. patent No. 2867001. Complete identification is molded into the jacket so it won't rub off.

Buna rubber insulation is built to exceed ASTM D-755 test requirement. Jacket and insulation are Synchro-Cured, the exclusive Bronco process of vulcanization, to work as an indefatigable team.

WRITE FOR FREE SAMPLE!

WESTERN INSULATED WIRE CO.
Los Angeles 58, California

Bronco Representatives in the West:

CALIFORNIA, Western Insulated Wire Co., (Home Office) 2425 East 30th St., Los Angeles 58; The Curry Co., 305 King St., San Francisco; **NEW MEXICO**, John Carder, Jr. Co., 1624 N. 1st St., Albuquerque; **OREGON**, George M. Roth, 1504 N.W. Johnson, Portland 9; **UTAH**, John Carder, Jr. Co., 1415 So. Main St., Salt Lake City; **WASHINGTON**, Jack H. Stumph, 1000 - 4th Ave., South, Seattle 4.

LETTERS TO THE EDITOR

(24) **RADIANT HEAT**—A catalog describing its full line of baseboard, wall panel and ceiling recessed glass electric radiant heaters is available from Berko Electric Mfg. Corp. Copies of this catalog, GC-106, are available from leading electrical distributors or direct from the manufacturer, Catalog Department, 212-40 Jamaica Ave., Queens Village 28, N. Y.

(25) **SUBSTATIONS**—Release of a 44-page booklet (PSG 559) on secondary unit substations has been announced by Pennsylvania Transformer Division, Mc-Graw-Edison Co., Canonsburg, Pa. The booklet contains descriptions of the company's substation line (articulated and integrated, indoor and outdoor), definitions and general application data. All major components are shown and described in detail.

(26) **GENERATORS**—Characteristics of Allis-Chalmers high-speed, packaged brushless synchronous generators in 40- to 300-kw ratings are given in bulletin 51B9192. These are said to provide new dependability, minimum maintenance, constant voltage and no sparking. The publication is available from the manufacturer at Milwaukee 1, Wis.

(27) **CHART**—Simplified procedures for making permanent electrical connections to any copper conductor or steel structure are described and pictured on a wall chart available from Burndy Corp., Norwalk, Conn. The two-color chart, on board, measures 16 5/8 x 22 in. It shows how to use the ThermOweld process for making a broad range of dependable connections economically without an external power source, the manufacturer states.

(28) **LIGHTING SUPPORTS**—Channel-type lighting supports for installing wiring and electrical lighting fixtures in plants, industrial and commercial buildings are discussed in an illustrated, eight-page bulletin (G-2) published by manufacturer Steel City Electric Co., 1207 Columbus Ave., Pittsburgh 33, Pa.

(29) **ASBESTOS WIRES**—Data on Bronco asbestos wires and cables are given in handy form in a pocket-size folder available from Western Insulated Wire Co., 2425 E. 30th St., Los Angeles 58. Requests should be directed to Richard O. Pallin, assistant sales manager.

(30) **TRANSFORMER DATA**—Padmount transformers for underground distribution systems are described in bulletin DT8. This new publication covers design and operating features, as well as application and ordering information. Copies may be ordered from Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis., or from L-M representatives.

(31) **VINYL SPRAY**—A promotional folder covering new MVC-1 vinyl spray in aerosol "spray-on" containers has been released by the National Electric Division, H. K. Porter Co. Inc., Porter Building, Pittsburgh 19, Pa. The vinyl coating seeks out rust and corrosion in metal surfaces, the manufacturer states.

KILL TWO BIRDS WITH ONE STONE—Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after January 1

Please send me, without obligation, the new product information or catalogs:

If described in Product News, circle item number

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17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

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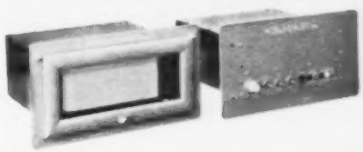
***Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.**

WHEN A FAULT OCCURS *you must know how your protective system operates—*

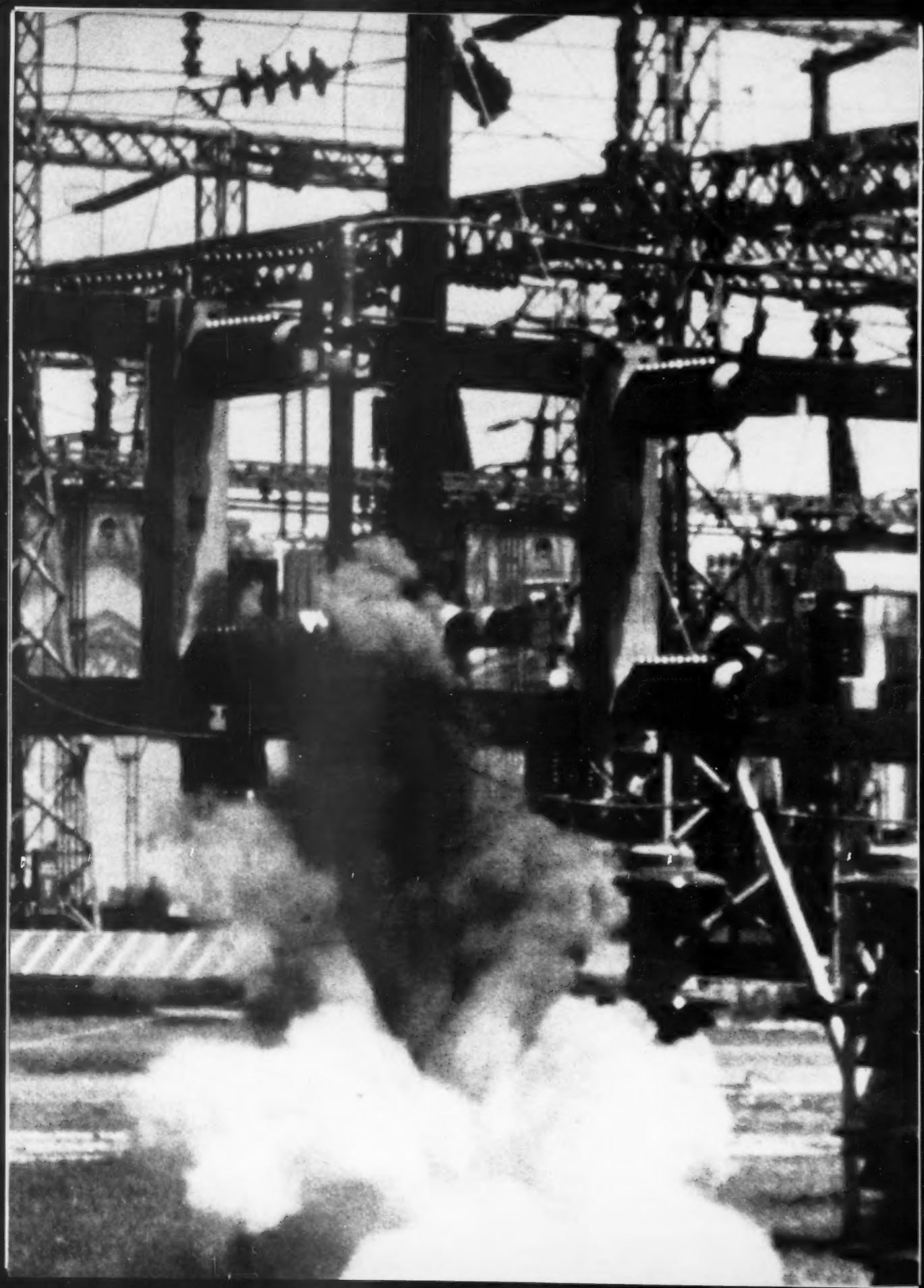
monitor automatically with the new...

HAMILTON *Direct Writing*
OPERATIONS RECORDER

This compact recorder is ideal for monitoring power company substations and unmanned transformer stations where an abnormal current or breaker operation will initiate a recording cycle. The resulting record permits analysis at any later time of the sequence of operation of protective equipment. Write today for Catalog No. 56485.



HAMILTON WATCH COMPANY
HATHAWAY INSTRUMENT DIVISION
5800 East Jewell • Denver, Colorado



Here is a 1,900,000 kva test shot on an S&C power fuse

...But what does it prove?

Absolutely nothing . . . without complete instrumentation and test data

TEST DATA

Data on Test Circuit	
* Normal frequency, cycles/second	60
Bus voltage, phase-to-phase, volts, rms	38,100
Bus voltage, phase-to-ground, volts, rms	22,000
* Power Factor	Less than 12%
Available Fault, computed	
Kva, three-phase, symmetrical	1,900,000
Amperes, rms, asymmetrical	46,500
Amperes, rms, symmetrical	29,200
Data Taken During Line-to-Ground Test	
From Magnetic Oscillograms	
* Normal frequency, cycles/second	60
Bus voltage (normal frequency), volts, rms	38,100
* Recovery voltage across fuse (normal frequency), volts, rms	22,000
* Current through fuse, amperes, rms asymmetrical	42,300
Arcing time, cycles	0.8
* Total clearing time, cycles	0.8
Arc energy, watt-sec.	383,000
Arc power, peak, watts	110,000,000
From Cathode Ray Oscillograms	
Natural frequency, cycles/second	19,000
Recovery voltage, across fuse	
(Normal frequency) volts, peak	31,000
(Natural frequency) volts, peak	32,000
Rate of rise, volts per μsec ($4E_{o\text{-}p}$ f x 10^{-6})	2,430

*Required by AIEE and NEMA testing standards

—such as the quantitative record (shown at left) of this short circuit test shot.

without skillful analysis

Even when the fuse clears, the test data have to be critically examined. For example, could this apparently successful test shot have been just a lucky—or easy—break? Was the natural frequency of the circuit unrealistically low? Was the rate of rise and/or the amplitude of recovery voltage across the fuse high enough? Does the arc energy developed suggest marginal operation? These questions are tough to answer for anyone but a fuse expert. They aren't covered in NEMA or AIEE short circuit test standards.

without multiple shots

For a given test condition, numerous shots must be made to factor the variables of fuse ampere rating, manufacturing tolerances, and minor differences in construction.

without a vast testing complex

One test (let alone one *shot*) is no basis for proving out a fuse. It has to be integrated with other tests amassed over the years in the field and in the laboratory, in order to substantiate the published interrupting ratings at all voltages, for all circuit parameters, at all fault levels.

This kind of electrical testing is essential for the performance integrity of a high voltage power fuse. Expensive, yes! But you'll find it anyway behind S&C's type SMD Power Fuse. You won't find it behind the bargain varieties which use ballistics as a substitute for electrical testing.

The reproduction from test film (left) and the test record (above) cover one of 19 shots on one type of SMD Power Fuse on one voltage rating (34.5 kv), at two high fault levels on just one day of testing.

Oh, by the way, all that the 19 shots proved was that the SMD is satisfactory for very high (and tough) phase-to-ground faults on a 34.5 kv system. That's all S&C got from a single day's testing! It's simply a small part of the 20-year testing complex which backs up the SMD's ratings.

S&C ELECTRIC COMPANY
4425 Ravenswood Avenue, Chicago 40, Ill.

S&C

Are the appliances you want most in the new home you plan to buy?

Every MEDALLION HOME has an all-electric kitchen with electric range and oven—and more from this list of additional appliances:

Electric DRYER
Electric WASHER
Electric DISHWASHER
Electric REFRIGERATOR
Electric WATER HEATER
Electric GARBAGE DISPOSER

The Medallion award on a new home guarantees you major electrical appliances, already installed. And you get ample wiring ... full Housepower for future needs ... *plus* lighting which is both functional and beautiful.

So look for the Medallion—national symbol of better housing and modern electric living. It identifies today's best new-home buys in every style, size, location and price range. No family should buy a home without the Medallion Home award.

SOUTHERN CALIFORNIA Edison COMPANY *helps you* LIVE BETTER—ELECTRICALLY

Sell a new world of warmth...

Arvin

RADIANT AND FAN FORCED ELECTRIC WALL HEATERS

Your customers will welcome the warm comfort, appreciate the handsome styling and be glad they chose an Arvin no matter which of these fine electric heaters they decide to buy.

And buy they will because of the decided overall superiority of the Arvin line. Instant heat, complete safety, ease of installation, attractive prices are all customer-convincing Arvin advantages that give you a big edge over competition.

Arvin's 27 years of experience and world leadership in portable electric heat is so readily apparent in the entire line that even a casual comparison with others emphasizes the business wisdom of selecting Arvin.

Saleswise, profitwise, the Arvin line will work best for you!

Arvin 400 Series-Heavy-duty, for home or office use. Push button controls, Safety Limit Thermostat and warmth-casting reflectors are buy appeals in all models.

Arvin 300 Series—In Summer the husky fan cools, in Winter it provides extra penetration of warmth. Push button controls in all five models.

Arvin also manufactures a complete line of Ceiling Cable with deluxe and standard wall thermostats in both single and double pole.

Arvin 100 Series—Instant heat, high styling, complete safety win sales for these sleek, slim-lined radiant bathroom heaters. They're wanted on sight!

Arvin 200 Series—Best of all bathroom heaters. Nichrome® elements produce a wealth of warmth, quiet fan circulates it, thermostat maintains temperature.

Arvin

ARVIN INDUSTRIES, INC.
Consumer Products Division
COLUMBUS, INDIANA

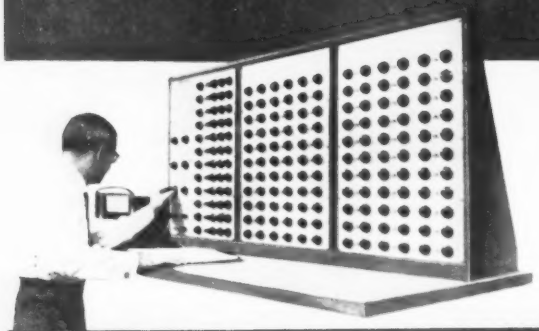
"TOMORROW'S LIGHTING TODAY"

School lighting fixtures that reduce lighting costs one third. Send for free booklet!

Write for: "Bringing New Benefits To Stores and Offices." 40% sales increase! Worker's efficiency up 5½%.

Factory lighting fixtures that do a superior lighting job with low initial cost plus low maintenance.

Rugged, modern outdoor lighting. Special lighting consultants are available without obligation.

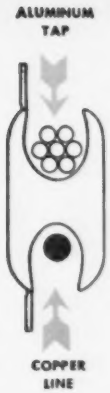


SMOOT-HOLMAN'S ADVANCED DESIGN ANALOGUE COMPUTER* is able to solve numerous and complex lighting problems. It scientifically determines specifications for illumination and fixtures that will deliver unsurpassed performance in each situation.

*Smoot-Holman Exclusive! Only computer of its type used by a lighting manufacturer.

SMOOT-HOLMAN COMPANY *Inglewood, California*

new! KEARNEY DOUBLE-TAB SQUEEZON



Exclusive Kearney design permits either groove to be used for line or tap. Diagram illustrates Double Tab Squeezon used to make an aluminum "step-up" tap to copper line connection.

NOW! The Easiest Way to Make Both "Step-Up" and "Step-Down" Tap Connections on All Combinations of Copper, Aluminum and ACSR

The newest, most versatile Squeezon Compression Connector. Dual, fully open groove design, exclusive with Kearney, eliminates need to thread tap conductor through fitting. Use *either* groove for line or tap . . . make "step-up" or "step-down" tap connections quickly and easily. Double Tab Squeezons speed up deadending, too. Form the loop . . . drop the conductors into the open grooves . . . and compress! On insulated wire, remove only a "Squeezon-length" of insulation!

Available in a range of size combinations for aluminum, copper or ACSR. (Write for Selector Card.) Individually packaged in handy "Snap-Open" boxes; grooves factory-filled with Kearnalex inhibitor and contact aid.

REVERSIBLE
The only compression connector with built-in spacer that makes *BOTH* "step-up" and "step-down" tap connections, from copper to ACSR, aluminum to ACSR, or aluminum to copper.

MASSIVE SPACER
Separates conductors . . . eliminates strand cutting . . . and aids in the prevention of galvanic corrosion between dissimilar conductors.

SECONDARY DEADENDING
Faster, easier. No threading through . . . form the loop, position Squeezon and compress! On insulated wire, strip only enough insulation to make the connection.

"SNAP-OPEN" BOX
Individually packaged. Box snaps apart along perforated line . . . INSTANTLY, CLEANLY . . . even with gloves! No stripping, no peeling.

NO DISTORTION
Squeezon groove jaws completely encircle conductor when compressed . . . provide dependable long-line, full circumference contact without distortion or damage to conductor.

for better construction . . . safer maintenance . . . specify KEARNEY products

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

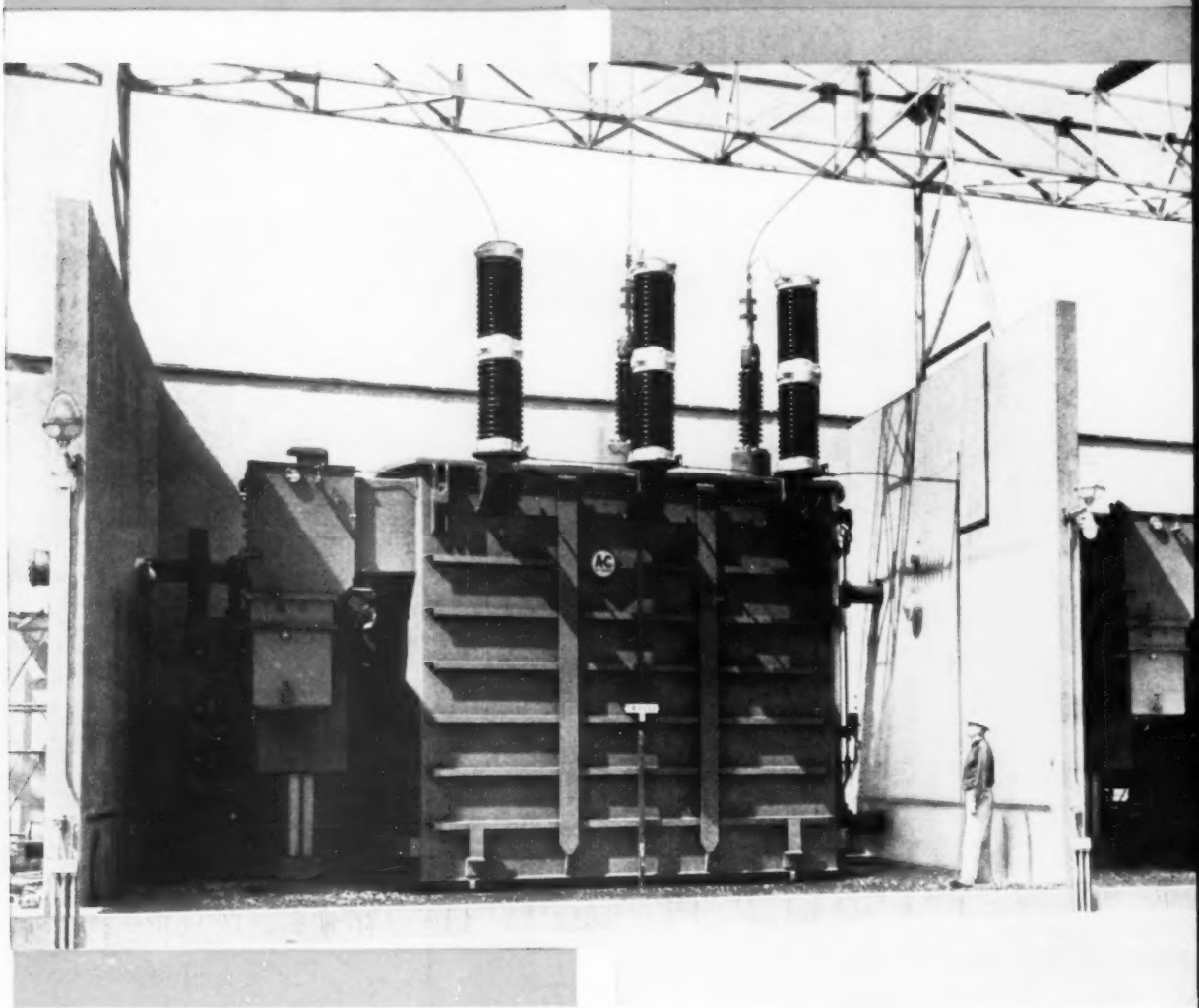
JAMES R. KEARNEY CORPORATION

4224-42 Clayton Avenue, St. Louis 10, Missouri

PLANTS AT: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH & CLARINDA, IOWA • GUELPH, ONTARIO, CANADA

IN THE WEST: for prompt service, contact Kearney's West Coast Distributor, **Maydwell and Hartzell, Inc.,**
Los Angeles • Seattle • Portland • San Francisco • Spokane • Phoenix.

ALLIS-CHALMERS... Pacing



AT WISCONSIN ELECTRIC POWER COMPANY

Dual cooling takes the heat off emergency loads

*Patented

Power Progress

Manual shutoff valves serving transformer cooling equipment piping are opened when dual cooling is necessary. A transformer can be taken from service without draining the oil from the unit or its piping.

A-1155-E

Either of two 90-mva transformers is capable of carrying 2/3 of the combined capacity by using the "dual-cooled" feature

Wisconsin Electric Power Company counts on *designed-in* power transformer emergency capacity. Exclusive *dual-cooled* arrangement* uprates either one of the 90-mva transformers to 120 mva if the other is removed from the line.

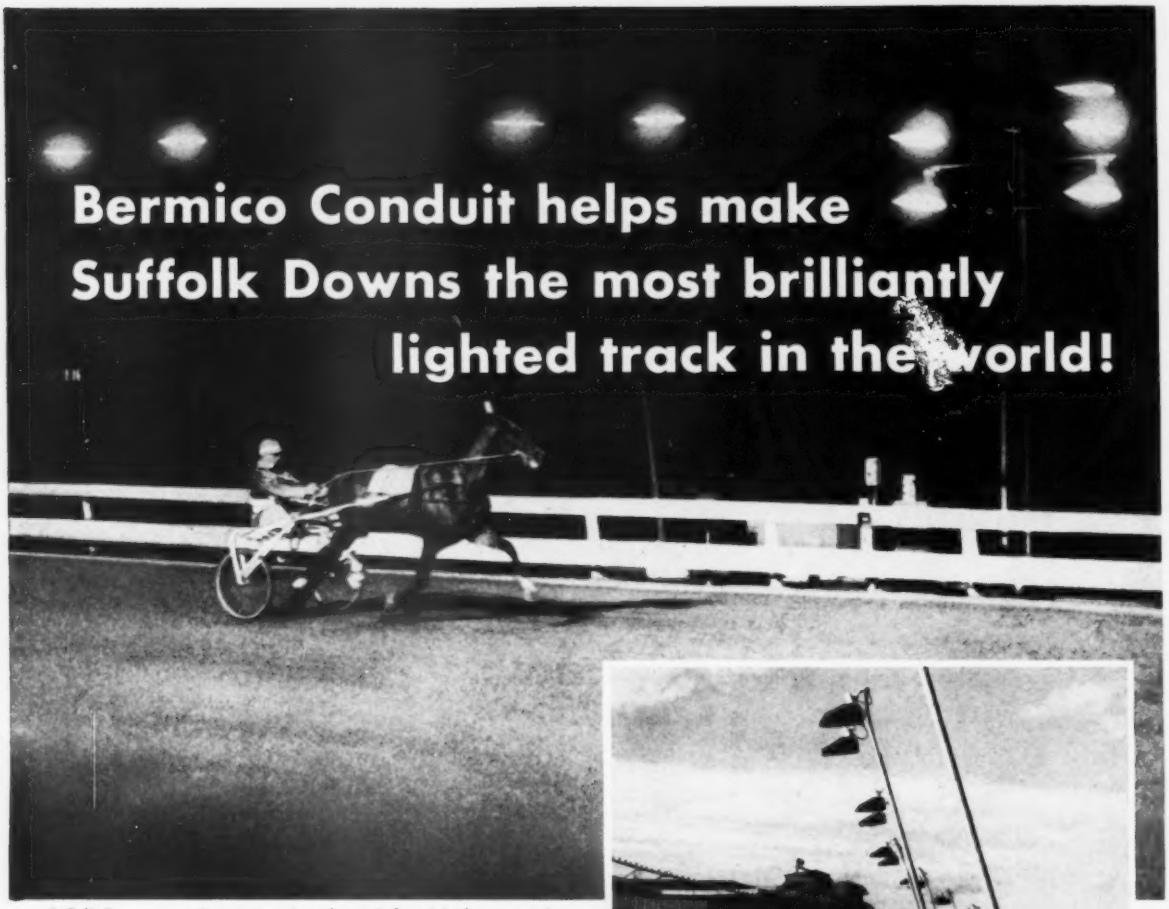
The active transformer utilizes all of the other unit's oil-to-air cooling equipment to dissipate heat. In normal operation, each transformer uses its own coolers independently.

Stepping down 138,000 volts to 13,800 volts, the transformer bank employs accordion-type expansion joints between transformers. Header pipes allow for manual cutoff. The installation has been designed to permit adding a third transformer should demand require it.

Dual cooling is but one of many A-C advantages resulting from continuing transformer research. Others include corona-free design, quiet operation, reduced size and weight, high short-circuit strength. A call to your A-C man will bring further dual-cooling power transformer details.

ALLIS-CHALMERS A-C *POWER FOR THE FUTURE*

Bermico Conduit helps make Suffolk Downs the most brilliantly lighted track in the world!



Suffolk Downs . . . America's only mile track for night harness racing

Suffolk Downs now leads a double life. It serves as a jockey track by day . . . as a harness track by night.

To equip this 25-year old track for night attendance, 3 miles of Bermico Conduit were used in the backstretch alone. To floodlight the homestretch, 6 miles of Bermico were required. The parking area took another 5 miles of rugged, long-lasting, corrosion-resistant Bermico Conduit.

Bermico was selected for this job partly because of the speed and ease with which it can be installed. In a job of this magnitude . . . that is an important economy. Other features that recommend the use of Bermico are its resistance to heat, water, acids and alkalies; its high dielectric strength; its smooth inside bore, which permits easy pull-through without abrasion. Made from cellulose fibre, impregnated with coal tar pitch, Bermico is precision engineered. Try it on *your* next lighting installation.

Arthur S. Hamilton, Jr., Consulting Engineer and M. B. Foster, Electrical Contractors, teamed together in the electrification of this famous horse racing track. Suffolk Downs is conveniently located in Massachusetts' East Boston section.

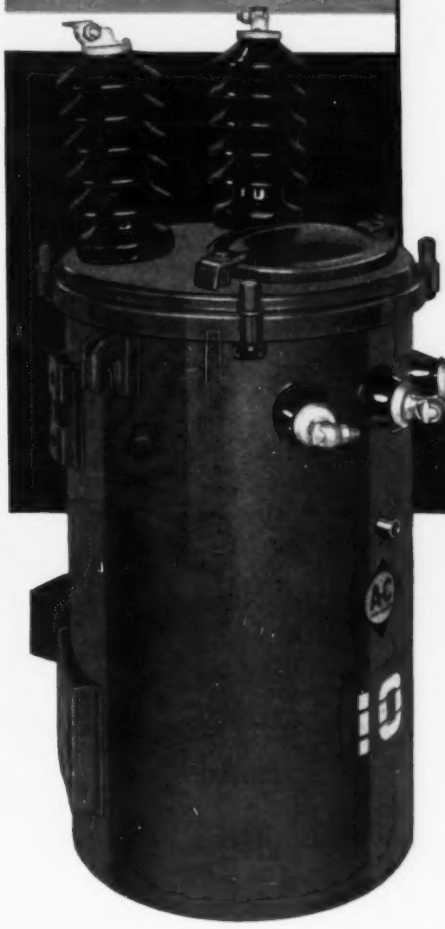
Another quality product of

BROWN COMPANY

681 Market Street, San Francisco, California

ALLIS-CHALMERS... Pacing Power Progress

Proof—
Allis-Chalmers distribution transformers mean more revenue



COMPARISON OF EXCITING CURRENT VALUES

5 kv and below (Test data from 2400-volt units)			Above 5 kv (Test data from 7200-volt units)		
Kva	Previously published	New guaranteed value	Kva	Previously published	New guaranteed value
5	3.2	3.0	5	3.5	3.0
10	2.7	1.5	10	3.0	1.5
15	2.1	1.5	15	2.6	1.5
25	1.7	1.5	25	2.0	1.5
37½	1.6	1.0	37½	1.8	1.5
50	1.5	1.0	50	1.6	1.5
75	1.5	1.0	75	1.5	1.0
100	1.5	1.0	100	1.5	1.0
167	1.4	1.0	167	1.5	1.0

EXCITING current cut as much as 60%

Reduction of exciting currents . . . by as much as 60% . . . means Allis-Chalmers distribution transformers give you greater system efficiencies four ways:

1. Generating capacity requirements are cut. Only minimum amounts of nonrevenue-producing exciting current are needed.
2. Lower exciting currents help reduce copper loss on transmission lines.
3. Your system carries a higher amount of revenue-producing power.
4. Reduces need for system power-factor corrective equipment.

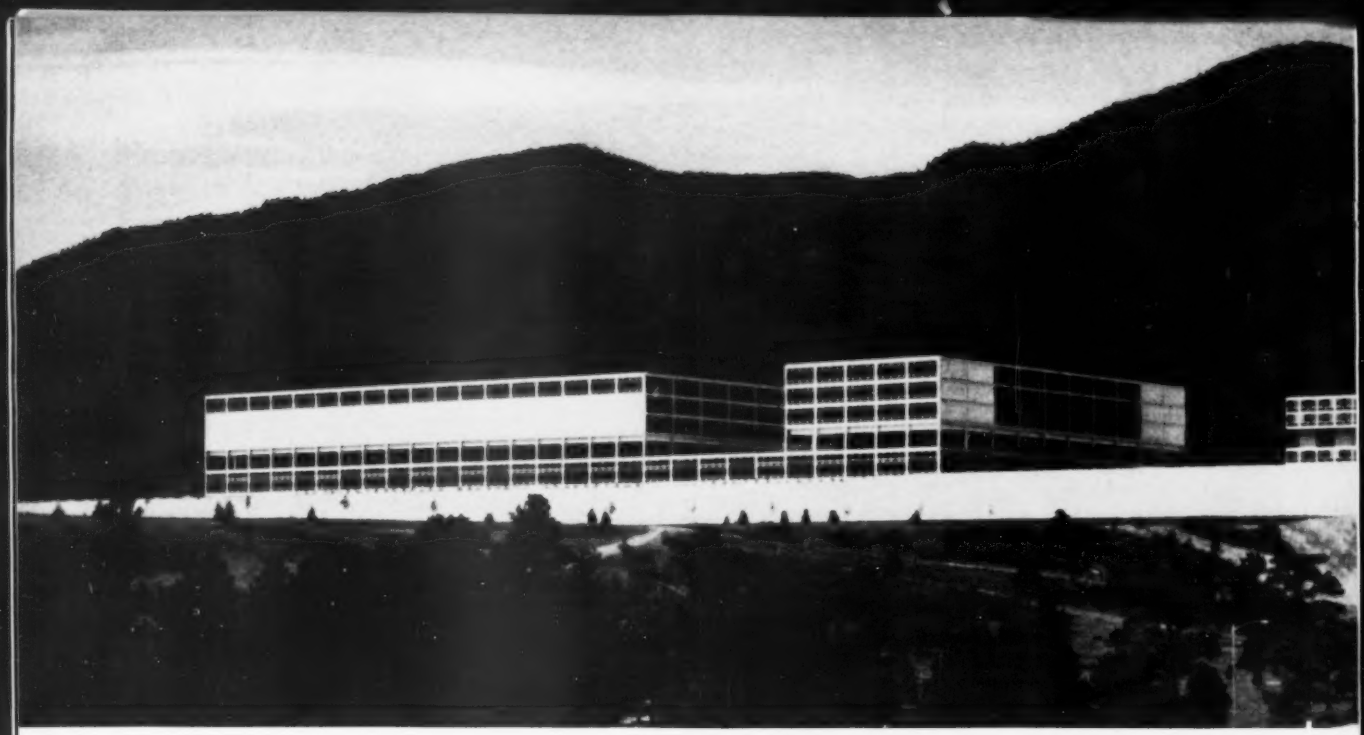
The new Allis-Chalmers guaranteed values are available to you in all A-C distribution transformers up to 167 kva . . . in all voltage classes.

Get all the details from your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-C **ALLIS-CHALMERS**

A-1202-E

For phone number of closest representative see advertising index in back of book.



United States Air Force Academy, Colorado Springs . . . dramatically positioned with the Rampart Range of the Rocky Mountains as a backdrop.

Architects & Engineers: Skidmore, Owings & Merrill.

Electrical Engineer: Syska & Hennessy, Inc.

Fairchild Hall where open floors give a semblance of flight. The outside corridors are illuminated by special corner fixture troffers using lenses to direct light outward.

Cafeteria in the headquarters building in the service and supply area. Here flush mounted troffers with curved lenses assured a pleasing lighting effect of low brightness luminescence.

A monument to tomorrow...

The Air Force Academy

Complemented by AllBrite Lighting in Keeping with the Space Age

A calvacade of contrast . . . that's the Air Force Academy near Colorado Springs.

Buildings of aluminum, glass and white marble in military order seem to march down a mesa of broad terraces. There are buildings within buildings, separated by courts. All in all, there is earthbound strength in their precise arrangement. Yet, a sense of air and flight permeates structures that stand on stilts. Here and there floors are left completely open. Colored walls of glass mosaic read as vertical planes to add illusion of height.

This feeling of the future challenged imagination in illumination so unusual effects were sought. In one instance open floor areas were illuminated by special AllBrite corner troffers using lenses which gave light an outward direction, adding to the semblance of flight. In another, an office area was bathed in low brightness luminescence to create an unusually restful atmosphere. This was achieved by AllBrite troffers with curved lenses.

Thus did architects Skidmore, Owings & Merrill wed lighting to the total design concept of a monument to tomorrow . . . and with special skills and products AllBrite engineering served the architects well. Curtis-AllBrite Lighting, Inc., AllBrite Lighting Division, 352 Shaw Road, South San Francisco, California; Curtis Lighting Division, 6135 West 65th Street, Chicago 38, Illinois.

East end of the headquarters building in the service and supply area. Lighting was achieved by troffers with curved lenses which assured an unusually restful atmosphere.

CURTIS

visioneers in planned lighting

All-Brite

New ORANGEBURG® CA* CONDUIT *with Flush Coupling Attached!*

With no separate couplings to handle or attach on the job Orangeburg CA lays faster, costs less to install. Each long, light length has a *flush* coupling attached at one end and a standard 2° male taper at the other end, making installation a simple, one-step operation. And, since the coupling *is* attached, there are no coupling cartons to warehouse or carry to the job.

What's more, with the coupling *flush* to the conduit's outside wall, new CA is easy to stack, store and handle. The flush coupling also eliminates "staggered" joints in the trench. And that means real savings in cutting and tooling time.

Like the hundreds of millions of feet of Orangeburg fibre conduit in use since 1893, new CA has self-sealing joints and impermeable walls. Its smooth, 100% fibre raceway adds years to cable life.

New Orangeburg CA is available in 2", 3", 4", 4½" and 5" sizes. Orangeburg Standard and Nocrete Conduit, with separate sleeve couplings, are available as always. Write Dept. WE-119 for Catalog 52.

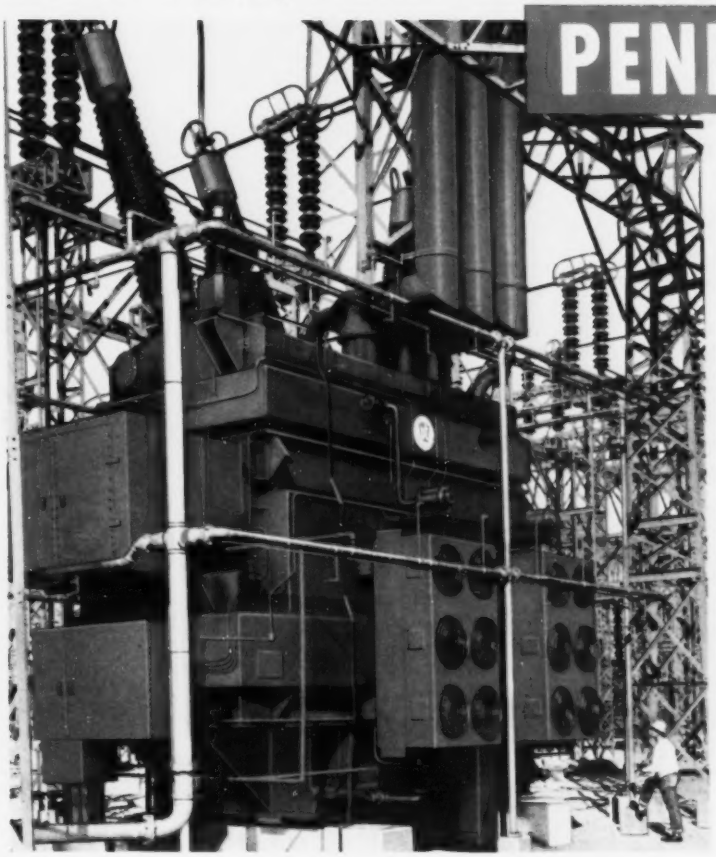
ORANGEBURG MANUFACTURING CO.
Orangeburg, New York • Newark, California
A Division of The Flintkote Company, Manufacturers of America's Broadest Line of Building Products

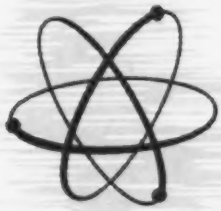
Orangeburg Fibre Conduit is distributed by Graybar Electric Co. and General Electric Supply Co. with branches and stocks in principal cities.

For phone number of closest representative see advertising index in back of book.

FOR 330 Kv POWER . . .

Atomic Energy Plant Relies on Two 100,000 Kva Transformers by PENNSYLVANIA





LOAD TAP CHANGING PENNSYLVANIA POWER TRANSFORMER

. . . one of two 100,000-kva Pennsylvania transformers located at the Portsmouth, Ohio, plant of the Atomic Energy Commission. The transformers step down a transmission voltage of 330,000 volts to 14,400 volts for plant distribution.

Two 100,000-kva Pennsylvania Power Transformers play a key role in the distribution of power throughout the Atomic Energy Commission's Portsmouth plant. With a high voltage rating of 330,000 volts, these "step-down" units are among the highest voltage transformers ever manufactured for use in this country. Their integrated load tap changing equipment boasts the "quiet ruggedness" that is so desirable in most present-day installations.

Other Pennsylvania features include corona-free high voltage coils that are designed for uniform impulse voltage distribution . . . and of course the well-known Pennsylvania "Contour Design" construction, which results in space-saving, weight-saving compactness.

McGRAW EDISON

For the full story on these and other Pennsylvania design and construction details, you are invited to contact Pennsylvania Transformer Division, McGraw-Edison Company, Box 330, Canonsburg, Pa.

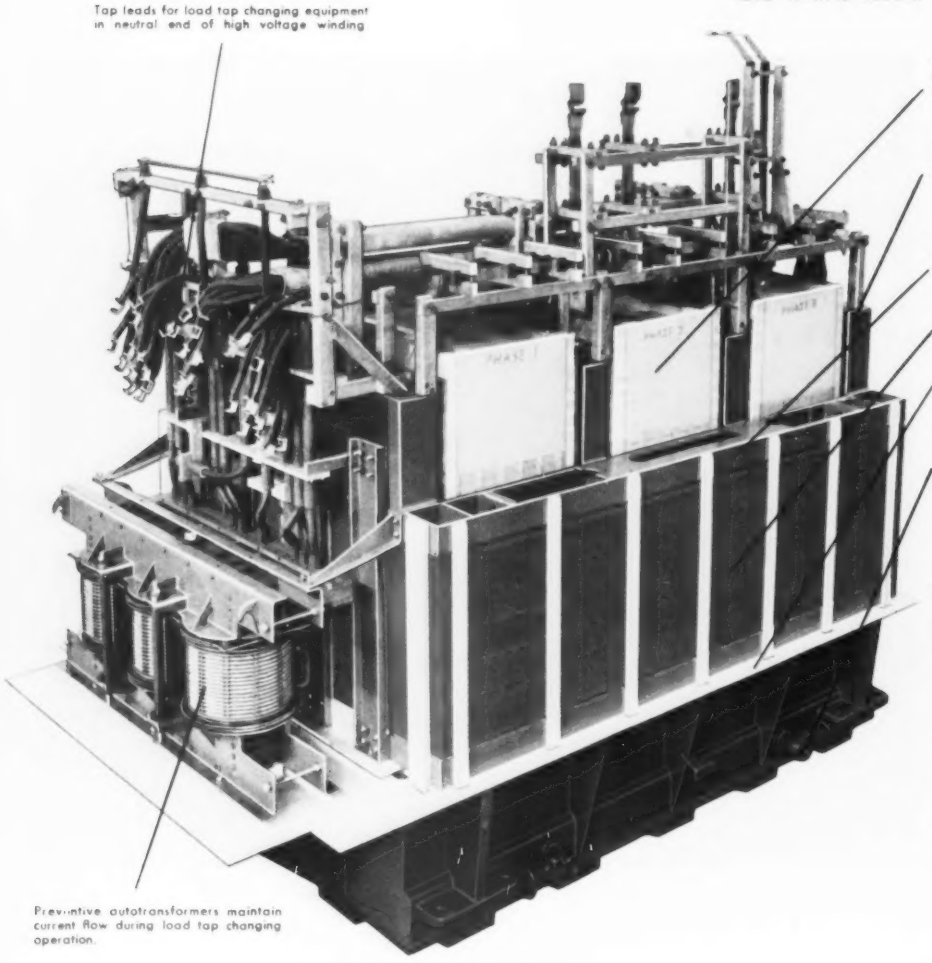
PENNSYLVANIA TRANSFORMER

PENNSYLVANIA POWER TRANSFORMERS

See other side for design details

330 Kv Pennsylvania Power Transformer

ONE OF TWO 100,000 Kva PENNSYLVANIA "*CONTOUR DESIGN*" LTC POWER TRANSFORMERS . . . in Step-Down Service at Atomic Energy Plant


Tap leads for load tap changing equipment in neutral end of high voltage winding
Vertical cooling ducts in coils permit free flow of oil through coils for most efficient cooling.
Heavy box sections which form part of core frame securely clamp coils to protect against mechanical forces during short circuits.
Core and coils clamped together with heavy steel frames to form a rigid structure. Core-and-coil unit can be handled separately as a complete sub-assembly.
Core cooled by both vertical and horizontal ducts.
Core-and-coil assembly rests on flange of bottom section of Contour Design tank.
Oil-distribution duct completely circles bottom of tank. Cooling oil from heat exchangers thus is evenly distributed upon re-entering tank.
Preventive autotransformers maintain current flow during load tap changing operation.

Interior view of one of two identical Pennsylvania transformers serving the Portsmouth, Ohio, plant of the Atomic Energy Commission.

100,000 kva, three phase, 60 cycles, 55°C. temperature rise. Forced-oil, forced-air-cooled, with four heat exchangers. High voltage: 330,000 Grd. Y volts. Low voltage: 14,400△ volts. Load tap changing equipment for ±10% regulation in 32 steps of 5/8%.

Pennsylvania has the *Facilities* and the *Capability* to meet the Largest Power Transformer Requirements...

- A large, expertly-staffed engineering department with long experience in power transformer design—both core form and shell form.
- The ability to design and construct scale models for proving design characteristics.
- A modernly equipped plant capable of producing and testing the highest rated units contemplated by industry today.
- Handling and loading facilities that permit full utilization of manufacturing, shipping and installation economies.

McGRAW EDISON

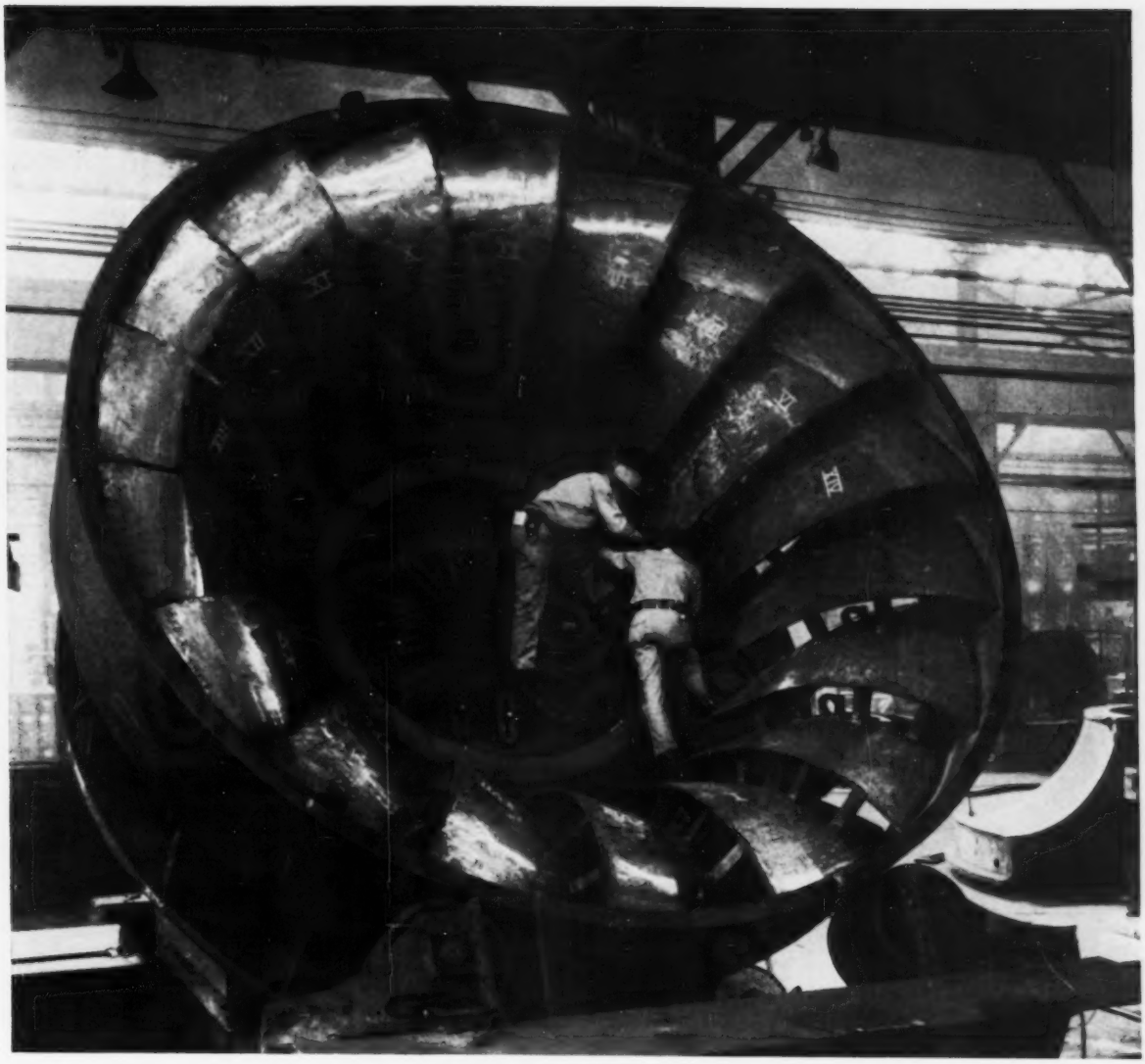
PENNSYLVANIA TRANSFORMERS

PENNSYLVANIA TRANSFORMER DIVISION

McGraw-Edison Company

CANONSBURG, PENNSYLVANIA Greater Pittsburgh District

See other side for installation view . . .



Runner for one of seven Francis turbines being built by B-L-H's Eddystone Division for Niagara Power.

Seven B-L-H turbines to produce 1,400,000 hp at Niagara

Baldwin-Lima-Hamilton's Eddystone Division is again tackling a really big turbine job. It is building seven Francis-type turbines—the mightiest hydraulic turbines ever made in the United States—for the main generating plant of the Niagara Power Project, now under development by the Power Authority of the State of New York. Each of these behemoths is rated at 200,000 hp when operated for best efficiency at 120 rpm under 300-ft. head. The huge plant, a 2,000,000 kilowatt installation designed to serve western New York, Pennsylvania and Ohio, is scheduled to go into operation in 1961.

Hundreds of the most efficient hydroelectric plants throughout the world owe their success to B-L-H's 130 years' experience in designing and building hydraulic turbine equipment. In addition to all four basic types of turbines—impulse, Kaplan, Francis and propeller—B-L-H also manufactures governors, surge suppressors, valves, special pumps, and other accessory equipment. For more information and a free copy of our *new illustrated Turbine Bulletin 1002*, write to Eddystone Division (B-L-H), Philadelphia 42, Pa., or Pelton Division (B-L-H), 2929 Nineteenth Street, San Francisco 10, Calif.

BALDWIN · LIMA · HAMILTON

Eddystone Division

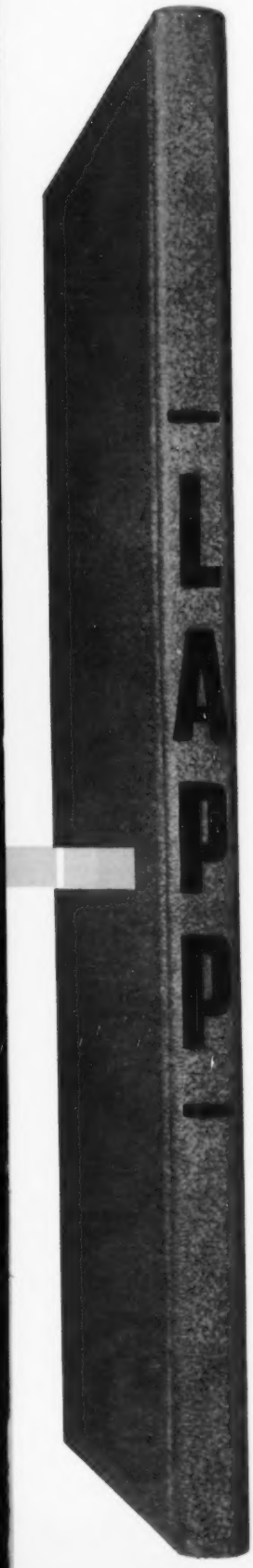
Philadelphia 42, Pa.

Hydraulic turbines • Weldments • Dump cars • Nonferrous castings • Diesel engines • Special machinery • Bending rolls • Ship propellers

For phone number of closest representative see advertising index in back of book.

ONLY

in Lapp Catalog No. 8 will you find:



FOUR COMPLETE LINES OF TRANSMISSION CLAMPS

FORGED STEEL
FORGED ALUMINUM
MALLEABLE IRON
CAST ALUMINUM

COMPLETE LINE OF LINE POSTS

INCLUDING NEW DISTRIBUTION POSTS
HORIZONTALLY-MOUNTED POSTS
WITH INTEGRAL GAINS
CLAMP TOPS

COMPLETE LINE OF STATION POSTS

IN 3 STRENGTH RATINGS
THROUGH 1470 BIL (345 Kv or higher)

INDOOR BUS SUPPORTS

TWO COMPLETE SERIES, INCLUDING
NEW NEMA STANDARD UNITS WITH
MATCHING BACK-CONNECTED BUSHINGS

LAPP SPECIALTY ITEMS

INDUSTRIAL INSULATORS
SLACK-SPAN INSULATORS
BOLT-END INSULATORS
PRECIPITATOR INSULATORS
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BUSHINGS . . . POC AND POC-A BUSHINGS
PAPER-OIL-CONDENSER TYPE
WIDE VARIETY OF DRY-TYPE
APPARATUS BUSHINGS, WALL AND
ROOF BUSHINGS

AND . . . THE MOST COMPLETE EVER-PUBLISHED
LISTINGS, TABLES, ENGINEERING DATA
AND INDUSTRY SPECIFICATIONS
FOR ALL TYPES OF TRANSMISSION,
DISTRIBUTION AND STATION INSULATORS

GOT YOUR COPY?

Lapp

Just off the press,
Lapp Catalog 8 is available to utility
and industrial users of high voltage insulators
and insulator specialties.

Write . . . LAPP INSULATOR CO., INC., LE ROY, N. Y.

WESTERN REPRESENTATIVES:

Los Angeles: Earl S. Condon Co.
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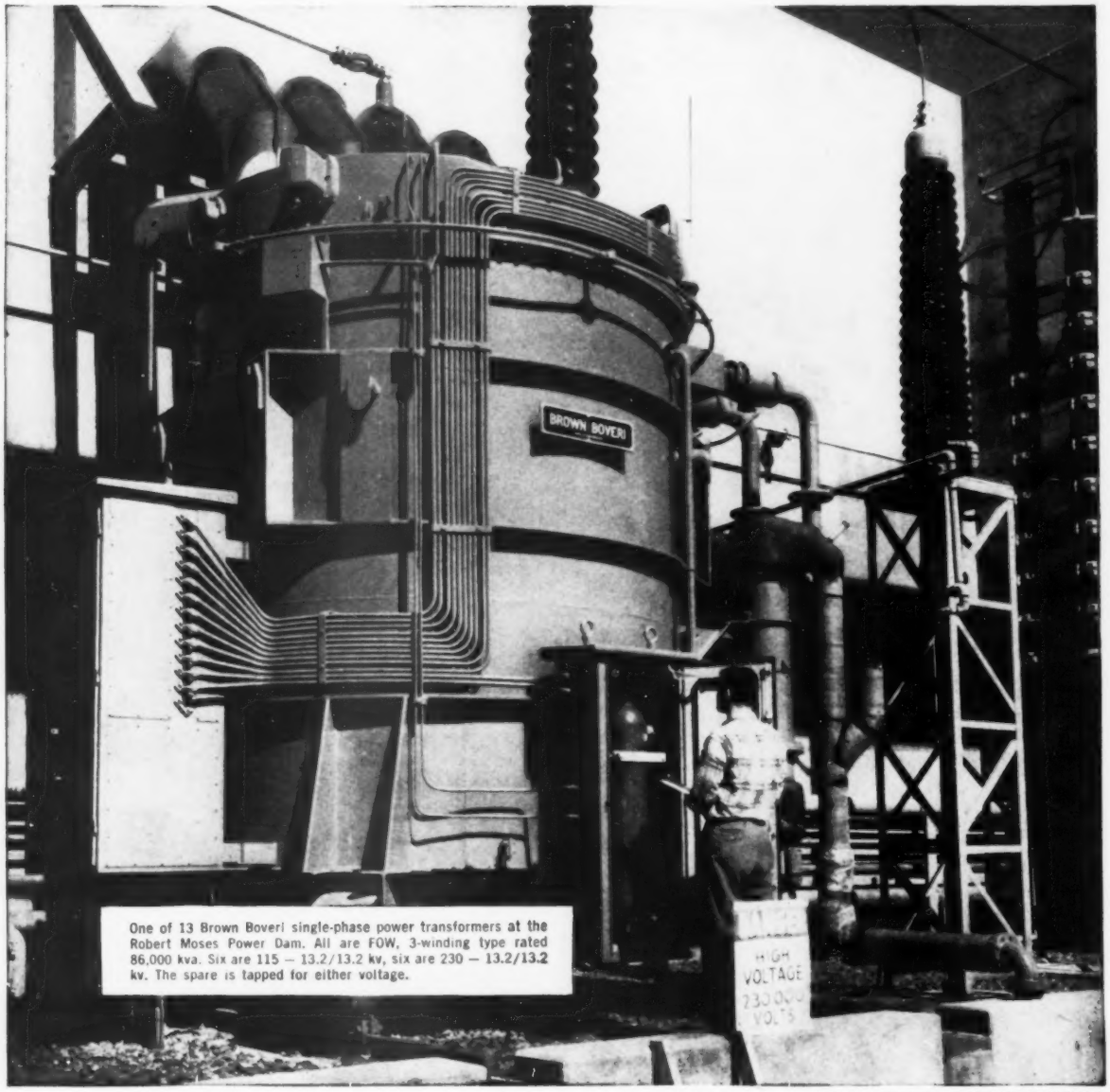


One of 13 Brown Boveri single-phase power transformers at the Robert Moses Power Dam. All are FOW, 3-winding type rated 86,000 kva. Six are 115 — 13.2/13.2 kv, six are 230 — 13.2/13.2 kv. The spare is tapped for either voltage.

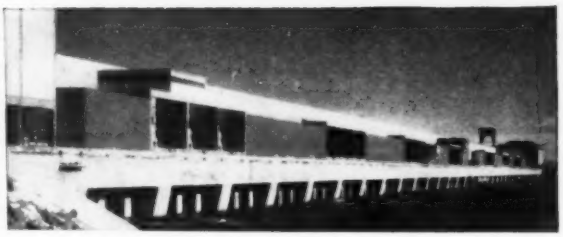
PHOTOS COURTESY OF N. Y. STATE POWER AUTHORITY

ALL'S QUIET AT MASSENA

You've heard the experts say it: Low noise means good design, tight construction. We agree. It's worth a trip to Massena just to hear the quiet around these Brown Boveri transformers.

Other features that can't be heard: the compact size, the light weight per kva, the high efficiency, the reliable service facilities . . . and the substantial dollar savings for a cost-conscious power producer.

Many of these features are due to Brown Boveri's exclusive radially laminated core. We'll be glad to give you full information about this core design and other features of Brown Boveri power transformers.



The Moses-Saunders Power Dam near Massena, N. Y., second largest hydro plant in the U. S. It was constructed jointly by the Power Authority of the State of New York and The Hydro-Electric Power Commission of Ontario.

BROWN BOVERI Brown Boveri Corp., Dept. EW10, 19 Rector Street, New York 6, N.Y. Agents in 27 U.S. cities

For phone number of closest representative see advertising index in back of book.

"one piece"
FARGO CONNECTORS
are easy to install

...EVEN HOT

A tough job made easy and safe under any conditions. Fargo vise type connectors for copper, aluminum and bi-metal connections are quickly installed even hot.

With the one piece design there are no loose parts or threads to engage during installation. The soft, flexible neoprene grommets while positioning the spacer bar do not interfere with the smooth easy operation of the clamp, but do assist in the easy insertion of the tap. Either one or two bolt connectors can be hooked on the run, the tap inserted, and the connection tightened.

The unique, one piece design of Fargo connectors is the answer with a complete range of sizes and types to meet your every requirement.

"5000 Series" . . . 8 - 1,000 MCM
The "V" grooves assure perfect alignment of the conductors in every case while the protected threads permit easy removal even from energized conductors.

"9000 Series" . . . 6 - 605 MCM ACSR
The soft, pure aluminum spacer provides a short, low resistance path between conductors and forms to the contour of the conductors sealing out moisture and corrosive media from the contacts.

"8000 Series" . . . 8 - 4/0 Str.
Only four connectors handle a wide range of conductors. The electrolytic copper spacer gives good conductor separation in addition to a high conductivity current path.

Distributed by
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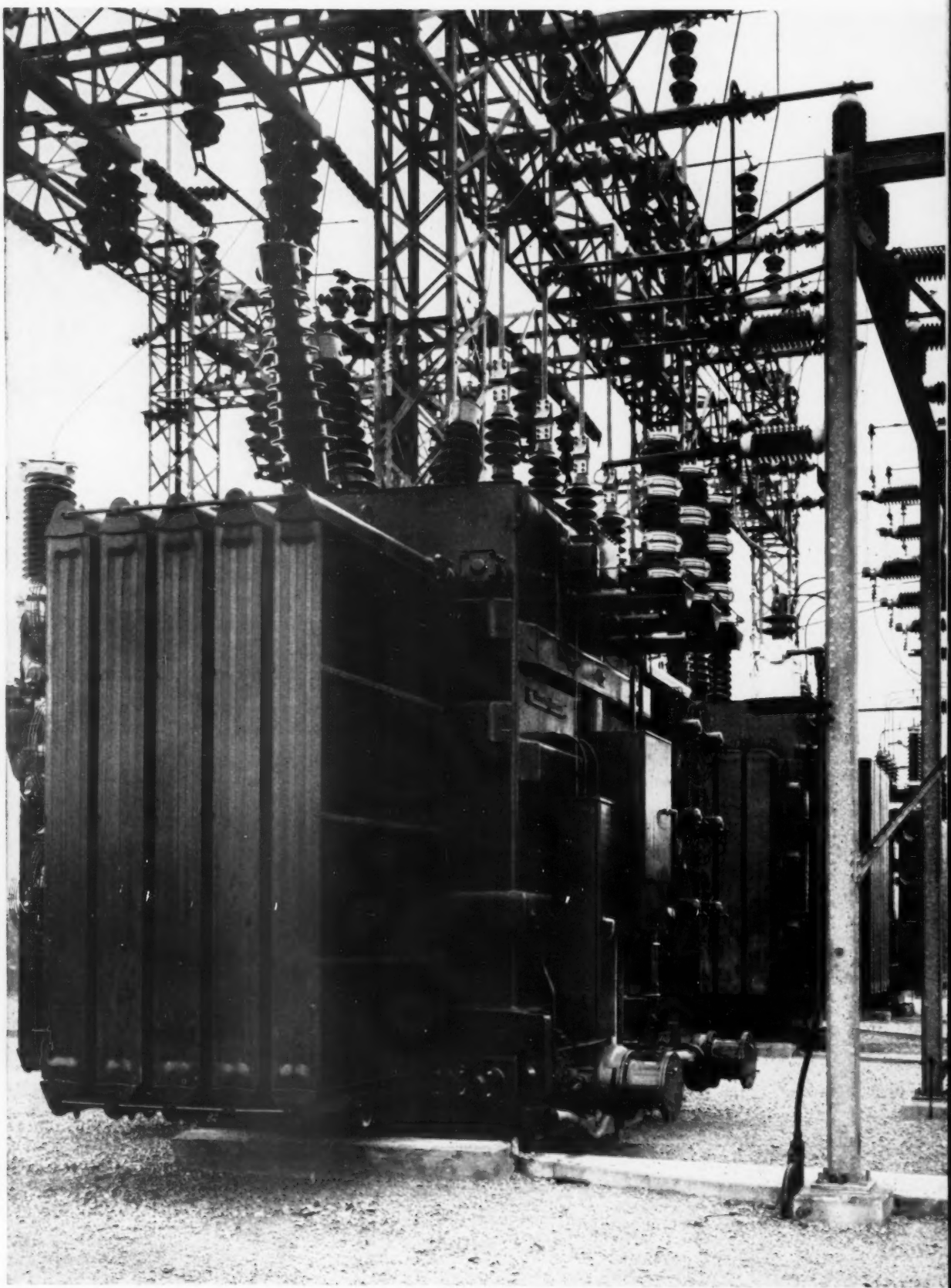
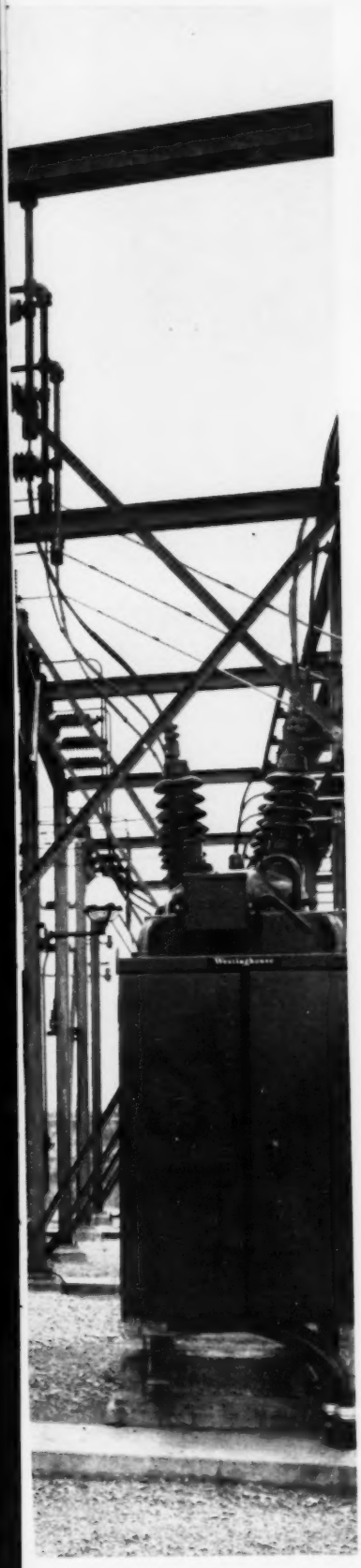
Milwaukee, Wisconsin
In Canada, CANADIAN LINE MATERIALS, LTD., Toronto, Canada

Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie
New York

FARGO

For phone number of closest representative see advertising index in back of book.





Bonus Value Beyond the Specification...

HIGHEST KVA PER POUND

New Westinghouse Inner-Cooled Transformer Construction Also Cuts Installation Space and Cost

New York State Electric & Gas Corporation recently installed the world's first transformer with Inner-Cooled construction. Developed by Westinghouse, Inner Cooling makes possible drastic size and weight reductions; in this instance, weight per kva of the 30,000/40,000/50,000-kva transformer has been reduced from 3.5 to 3.1 pounds per kva; and on the higher voltage, higher kva units, the weight per kva has been reduced to as low as 1 pound per kva.

In addition to the installation savings made possible by major space and weight reductions, Inner Cooling also promises operating savings through lower impedances and improved performance. And by crashing the size barrier, Inner-Cooled construction makes it possible now to build and ship transformers with ratings up to 600,000 kva or more . . . to meet all demands of the foreseeable future.

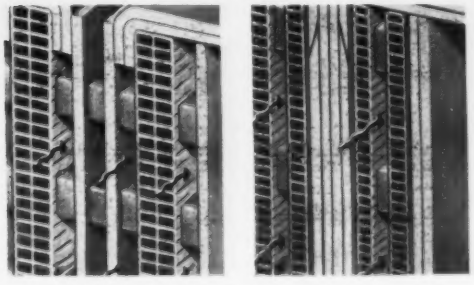
Ask your Westinghouse representative for the full story on the new Inner-Cooled construction—another "Bonus Beyond the Specification" made possible through Plowback of Earnings into transformer research and development.

J-70829

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

WORLD'S FIRST Inner-Cooled transformer (at left) is installed on the system of New York State Electric & Gas. Located at Hinman Road Substation, Lockport, New York, this Westinghouse power transformer is rated at 30,000/40,000/50,000-kva, OA/FOA/FOA. The Inner-Cooled transformer is installed in the same space as that of previously installed 15,000/20,000/25,000-kva transformer in the background.



Ordinary transformer construction (left) places the oil ducts on both sides of the coil consisting of multiple conductors wound in parallel. Inner Cooling (right) positions the oil ducts between the parallel-wound conductors, with cellulose material between adjacent coils. This utilizes fully both the dielectric and mechanical strengths of conventional transformer materials.

OTHER WESTINGHOUSE POWER TRANSFORMER BONUS VALUES

Insuldur* Insulation System—"Form-Fit" Construction—Vapor/gas Cooling—Reduced Sound Levels

*Trade-Mark

For phone number of closest representative see advertising index in back of book.

with the light came business

When Novato turned on its new Mercury Street Lamps, the community saw more cars pulling off the freeway into town... more towns-people stepping out after dark...fewer accidents and a big boost in civic pride.

This could be your town with *Modern Street Lighting.* Interested?

For a free lighting survey, contact your local P. G. and E. office. You can also obtain the free booklet "Modern Street Lighting for YOUR Community." You'll read how to bring your town the bright, safe, friendly streets you like.

P·G and E· *Pacific Gas and Electric Company*

SOMETHING NEW UP IN THE BLUE!

**ONE-PIECE SPACER DESIGN—
NO MOVING OR MATING PARTS:**

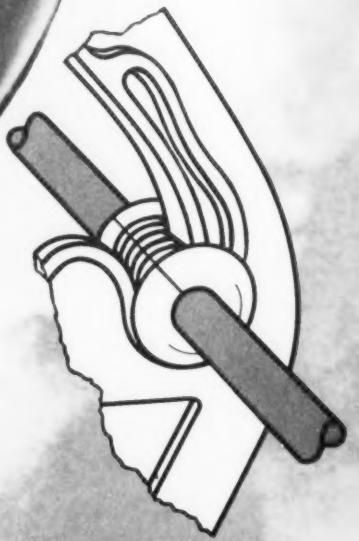
This design helps you in two ways:

(1) Smooth body permits self-washing . . . crevices that collect arc-causing contaminants are *eliminated*.

(2) The spacer is easy to install . . . no special line crews are necessary.

A lock ring securely fastens the spacer at the bottom. Once put in place and the phase conductor inserted, the lock ring is permanently attached.

Grommets are slit for easy application to individual conductors. Available in a number of sizes to fit any phase conductor or messenger diameter for 5-15KV systems.



COMPRESSION RINGS ON GROMMETS PREVENT "TRAVELING" ON THE LINES

An exclusive feature! Trimline's grommets have built-in compression rings to assure a snug cable-to-spacer fit. The proper distance between spacers is always maintained, because grommets prevent spacer from traveling.

ROME

TRIMLINE

PRIMARY DISTRIBUTION SYSTEM

NOW YOU CAN HAVE A MODERN AERIAL SYSTEM AT A MODEST COST!

Now spacer-type installations can be as *reliable* as they are *practical!*

This unique spacer design does it – part of the new Rome TRIMLINE Primary Distribution System! *There is no other spacer quite like it:*

It's all one piece – there are no cracks or crevices in which moisture or contaminants might collect to cause arcing.

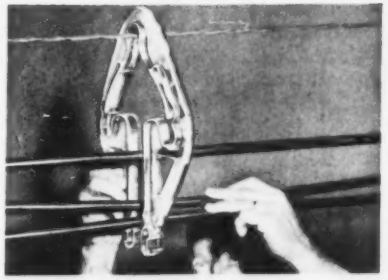
No nuts or bolts or special tools needed to install it. Even untrained personnel can do the job quickly.

Spacer completely encloses phase conductors and messenger to provide an extra measure of protection against storm damage.

You can use a TRIMLINE system to gain these advantages:

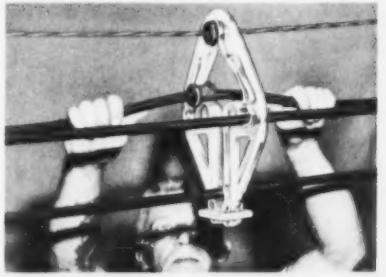
1. Reduces tree-trimming costs in bad tree areas.
2. Provides storm-damage protection not provided by open-wire systems.
3. One spacer accommodates systems of up to 15KV.
4. Eliminates the need for additional crossarms.
5. Provides a positive means of phase identification.
6. Can be easily tapped and spliced.
7. Provides excellent voltage regulation due to lower reactance.
8. Phases can be easily added or removed.
9. Neat, trim appearance for residential areas.
10. Ease of maintenance.

INSTALLS IN A JIFFY...WITHOUT NUTS AND BOLTS!



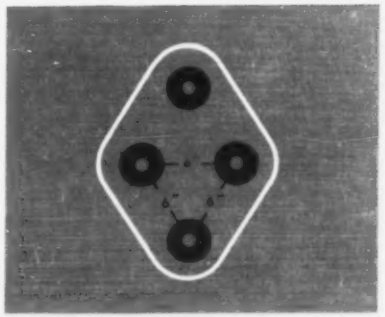
COLLECT conductors inside spacer.

CLAMP it shut with lock ring. No nuts or bolts to slow you down!

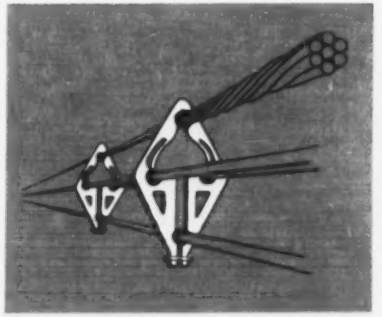


CLICK conductors (with grommets) in place – just a tug locks them tight!

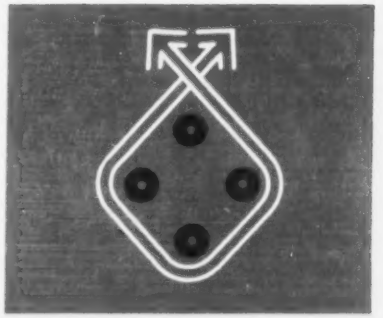
SEE HOW TRIMLINE SPACERS PROTECT YOUR SYSTEM



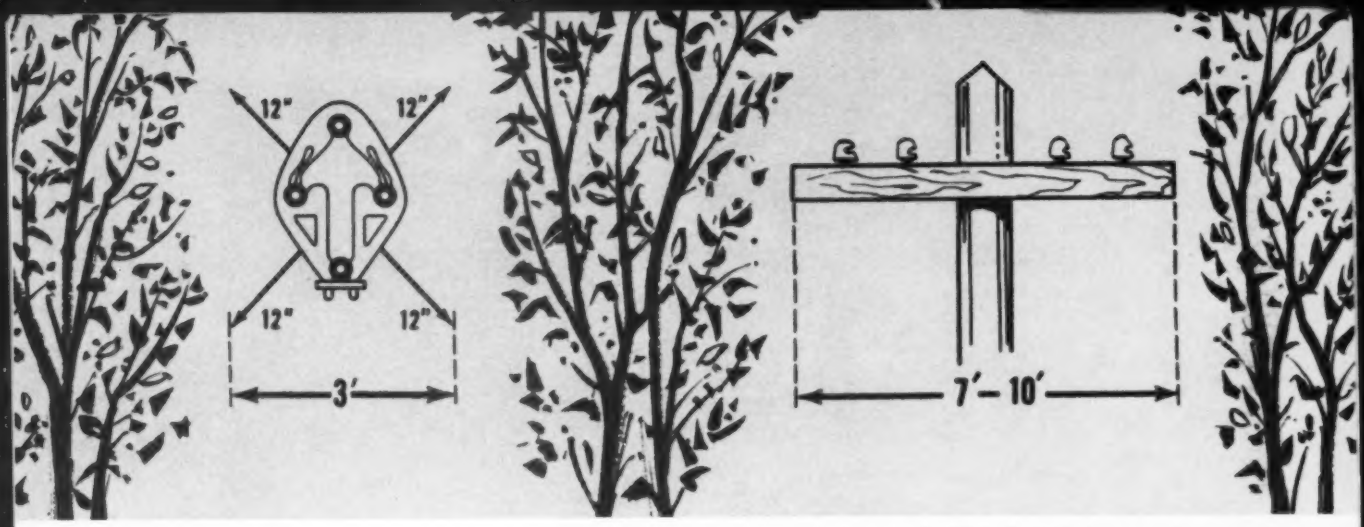
ARC- AND WEATHER-RESISTANT methyl methacrylate spacer is diamond-shaped. Phase conductors are spaced 6 inches apart on equilateral centers.



STEEL-REINFORCED messenger with frequent spacer supports provides a stronger system than open-wire. Spacers maintain positive conductor separation.

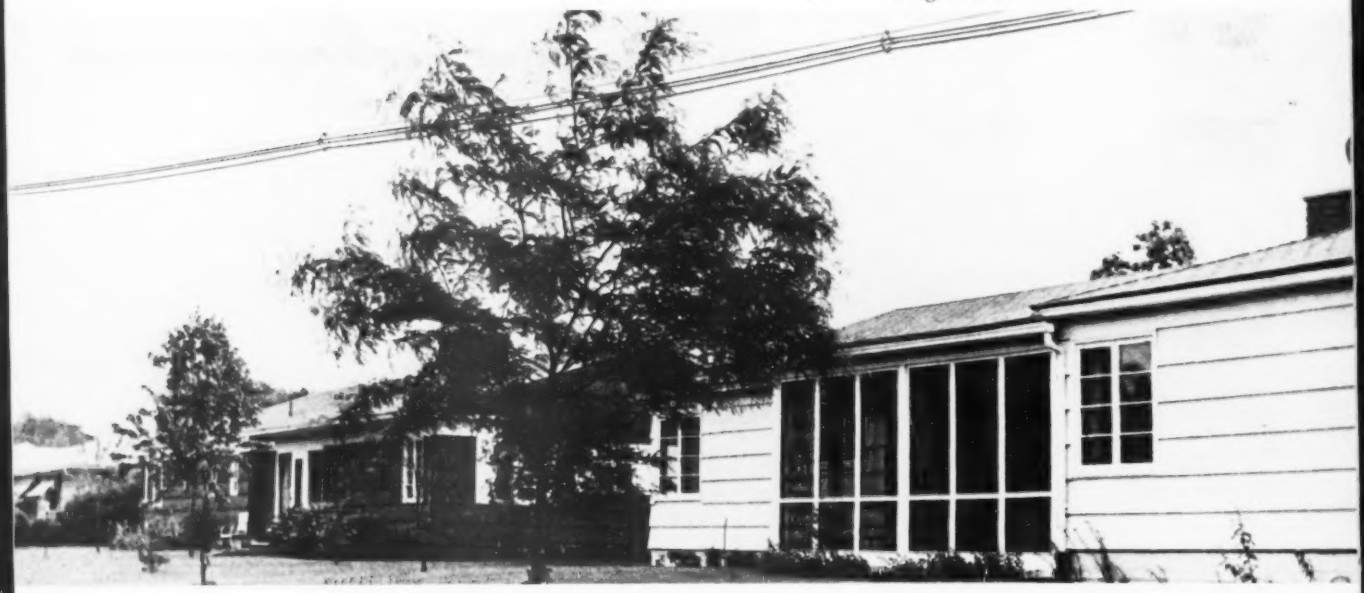


COMPLETELY ENCLOSES conductors. Messengers and phase conductors are *inside*, not *outside* the spacer itself. Conductors cannot work free of spacer.



REDUCE TREE TRIMMING

Because only 12 inches of clearance is necessary to accommodate a TRIMLINE spacer, you reduce your tree-trimming costs! The high-strength supporting messenger of the TRIMLINE System provides protection against falling branches – even trees – during storms.



TRIM NEAT COMPACT

Appearance of TRIMLINE is neat, compact – to please the townspeople. This modern system assures favorable public reaction to overhead circuits – especially in residential areas. And, because less tree trimming is required with TRIMLINE, you'll hear fewer complaints of "defacing" neighborhood shade trees.

MEET THE MAN

WHO'S DEDICATED TO YOUR JOB
YOUR ROME CABLE SALESMAN

ROME CABLE
DIVISION OF **ALCOA**
Dept. 110, Rome, N. Y.

I want to know more about TRIMLINE! Please send me Bulletin RCP-791.

Name .....

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Title .....

Street .....

City ..... *Zone* ..... *State* .....

SEND FOR FREE BOOKLET!

This holds the answers to whatever remaining questions you might have about TRIMLINE – the practical *and* reliable method of overhead distribution. To get your copy, see your Rome Cable salesman, or clip and mail this coupon today!

ROME CABLE
DIVISION OF **ALCOA**

Litho in U.S.A.

ELECTRICAL WEST SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S. VOL. 123, NO. 5 NOVEMBER 1959

Nonmilitary scientific advancements can have a profound effect on relationships with friendly nations. Here are abstracts from a thought-provoking study* on the . . .

Scientific Impact on Foreign Policy

Scientific developments in the next decade will give rise to or intensify many problems that must engage the attention of foreign policy planners. Scientific developments will also help solve foreign policy problems. But the outlook is that the progress of science and technology will do more to create or intensify than to ameliorate such problems, unless deliberate policy measures are taken.

Problems That Transcend National Boundaries

In the coming decade, science and technology will provide new means to use the vast resources of the oceans, to exploit the Arctic and Antarctic, to explore space, perhaps to affect climates. Unless better ways of cooperation are established, these advances into new frontiers will intensify international tensions. Current concepts of national sovereignty are not well suited to the orderly regulation of these advances nor to their development for maximum utility with minimum conflict. Policy planners will find it increasingly necessary to explore new types of supranational organization.

It is important to make sure that the United States advances rapidly in fundamental knowledge about these new frontiers and in imaginative new approaches to their utilization.

It is most likely that in the coming decade the explosive growth of population in many parts of the world will be accelerated by new scientific advances in public health and medicine. At the same time the revolution of rising expectations in underdeveloped countries will be further heightened by continued advances in communications and by the competition of Communist nations. This combination of pressures will lead to social unrest and even war unless the resources of science can be more effectively brought to bear on world problems of food, economic and social development, and population control.

Most important in meeting world food problems will be action to hasten the spread of known methods of food production, or suitable adaptation of them, to areas of chronic need. New, unconventional ways of producing food may become feasible if scientific and technological breakthroughs are achieved, such as finding new sources of protein or controlling photosynthesis, to mention only two possibilities . . .

No miracles should be expected from the prospective scientific and technological advances. Under present allocations of effort to research and diffusion of results, the outlook is that the urgency of the problems will increase faster than the means of meeting them. There is nothing to suggest complacency in the face of the world's threatening population and production problems.

With the passage of time, population control will therefore become imperative; the population problem is already acute in some parts of the world. Current scientific developments indicate that a radical advance in techniques, such as a safe, effective and inexpensive oral contraceptive, could soon be available if the comparatively small amount of research now under way in this field were stepped up. Greater than the physical and biological problems of birth control are the psychological and social problems to be solved if population growth is to be checked by methods other than famine, disease and war.

Energy, Synthetics and Trade

Advances in science and technology will in the next decade probably continue to increase America's growing dependence on foreign sources of raw materials and energy, including petroleum.

Scientific and technological advances will bring the partial or total displacement of a number of natural products by synthetics. Synthetics, or substitutes, will compete more intensively with rubber, leather and fibers (cotton, wool, flax, hemp, jute, etc.). It is very likely that a synthetic or substitute coffee will be produced in the near future.

Some of these products are highly important as foreign exchange earners and sources of employment in friendly countries whose welfare affects the security of the United States. It is staggering to realize that such displacements could have major repercussions in at least 15 non-Communist nations. Foreign policy planners need to consider well in advance what steps might be taken to lessen the adverse effects of these possibilities.

The spread of modern science and technology, bringing new production methods of underdeveloped, low-wage countries, will create both new competition and new market opportunities for U. S. producers. The problems of trade policy which will therefore arise deserve advance

*Abstracted from a study prepared by Stanford Research Institute for the Committee on Foreign Relations, U. S. Senate, entitled U. S. Foreign Policy—Possible Nonmilitary Scientific Developments and Their Potential Impact on Foreign Policy Problems of the United States.

SIZE OF THE WORLD, IN TRAVEL TIME
Supposing the Best Travel Technology of Each Epoch
Were Applied over the Whole Surface of the Earth

STAGECOACH AND SAILING SHIP
TO 1830's AND '40's
BEST REGULAR SPEED ON LAND AND SEA 10 mph

COAL-STEAM RAILROAD AND STEAMSHIP
LATE NINETEENTH, EARLY TWENTIETH CENTURIES
BEST REGULAR SPEED ON LAND 65 mph, ON SEA 36 mph

PROPELLER AIRCRAFT
TO 1950's
BEST REGULAR PASSENGER SPEED 300 mph

JET AIRCRAFT
FROM 1950's
REGULAR PASSENGER SPEEDS 500 mph AND UP

study and planning.

It would be wise for the United States to initiate, preferably in cooperation with other naions and international agencies, a forward-looking study of world prospects for production and consumption of important raw materials and finished goods . . .

International Communication

Significant developments affecting international communications will result in the next decade from continued advances in physical techniques and facilities and also from advances in the sciences of human behavior relating to mechanism of individual or group motivation and to meaningful interchange between members of diverse cultures. Developments such as low-cost mass communication devices, translating machines and teaching machines will provide new opportunities to diffuse knowledge and ideologies. Brain chemistry and the study of brain mechanisms may open up powerfully beneficial and yet potentially dangerous means to control minds.

These developments will be available to both totalitarian and democratic societies. A problem of increasing importance will be to decide how the United States can use the new possibilities offered by the sciences related to communication in ways consistent with democracy and concern for human freedom.

The national interest requires a more conscious direction of scientific activity in ways likely to assist in the achievement of America's international goals. The security and well-being of the United States call for a reappraisal of present allocations of scientific and technological effort with a view to directing more effort toward nonmilitary foreign policy challenges . . .

Deliberate Use of Science

The present allocation of scientific research and development efforts in the United States and in the world at large is overwhelmingly toward military needs and toward the needs of industry in technologically advanced countries. The emphasis is also overwhelmingly on the physical sciences and their applications, with the biological sciences and their applications second and the psychological and social sciences and their applications very far behind in allocations of effort and support. In view of the fact that foreign policy problems are mainly problems in human relations, this gross imbalance in research effort should be given thoughtful attention . . .

Foreign policy planning of the broadest kind, making use of the best scientific assistance, will be a critical requirement in the years ahead. This planning should include continual review of prospective scientific developments and their significance for international relations.

If the United States is to use science in a more positive manner to support its foreign policy, policy planners will need access to and the aid of the scientific community, including that part of the scientific community concerned with psychological and social disciplines. Planners will need improved methods of analyzing future scientific, political and economic possibilities, in order to create within the necessary lead-time the most appropriate policy alternatives to meet the rising tempo of new conditions.

Science and technology will probably advance even more rapidly in the coming decades and will increasingly alter the environment within which foreign policy must be formulated and executed. It is important to try to anticipate scientific developments in order to lessen the lag between new conditions and new policy responses. Any forecast of scientific developments and their effects is bound to be inadequate for periods more than a few years ahead. Therefore, provision is needed within the government for continual review of scientific and technological possibilities in terms of their foreign policy implications.

WWP adds a major hydro resource as . . .

Power Flows at Noxon Rapids

K. O. Strenge, Chief Civil Engineer, Washington Water Power Co.

On Sept. 1, 1959, Washington Water Power Co. began commercial operation of the first unit at its new hydroelectric project at Noxon Rapids, Mont. Noxon Rapids is located on the Clark Fork River, approximately 45 miles southeasterly from Sandpoint, Idaho, in Sanders County, Mont. This is nearly the fourth anniversary of the start of reservoir clearing work. During the early planning phase, analyses of loads predictions, available power resources, economic and financial studies indicated that power would be required at this time. Ebasco Services Inc., as owner's agency and consulting engineer, developed the schedule necessary to meet this requirement.

Construction Schedule

An interesting feature of this project was the time allowed for construction. Four years seem quite long when compared with the 200-mw Cabinet Gorge plant located 20 miles downstream from Noxon Rapids, which went on the line 21 months after start of construction. Actually, the schedule for Noxon Rapids was reasonable considering

August 1956 shows the spillway cofferdam in place and unwatered. The rock island in the river is used as an anchor. Excavation progressing on the spillway and northeast embankment areas. Notice position of finished dam in photo above

December 1956, looking upstream from the right bank, a 200-ft-wide gap was left in the spillway for passage of spring floods

the extensive railway relocation work and the fact that revisions to the schedule would have to be made in one-year steps.

The reason for the one-year-step changes is the characteristic flow of the Clark Fork River. From mid-July until April of the following year it is most probable that the flow will not exceed 30,000 sec ft. However, during the remaining three months of the year flows in excess of 30,000 sec ft can be expected with average annual peak flows reaching 90,000 sec ft and maximum peak flow estimated to be 160,000 sec ft.

With this flow pattern, it is clear that all diversion work must be completed during the nine months of low water—a period which is most difficult to work because of low temperatures and heavy snow fall.

With this hydrologic history, it can be seen that a contractor on dam construction on this river is limited by the amount of river bed work he can accomplish during each low water season. This limitation calls for an extremely careful analysis of diversion procedures and largely restricts the subsequent shifting of construction schedules.

Preliminary Work

In July 1951, the company began exploratory drilling work to determine the subsurface conditions at the Noxon Rapids site. Over 200 holes were drilled in the process of making the exploration of the dam site and seismic refraction investigations were made to determine depths to bedrock.

The entire area of the project was mapped by aerial survey supplemented by ground surveys and a coordinate system was laid out for construction purposes.

A preliminary permit was obtained from the Federal Power Commission on March 28, 1952, and extensions were later granted and an application for license was filed with the commission on Dec. 1, 1954. This license was issued on May 12, 1955.

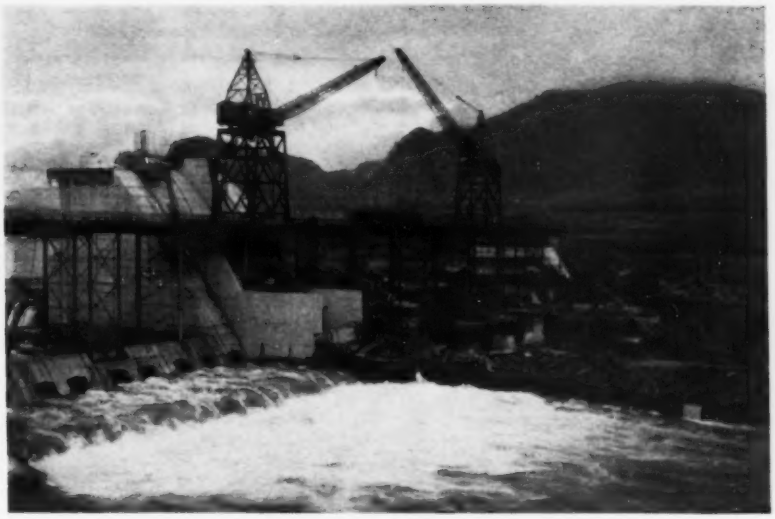
Model studies carried out at Washington State College were made on a model of the entire dam. Where necessary detailed studies were made.

Geology of Site

At the site of this project, the Clark Fork River is largely entrapped in a rock channel. This channel is part of a wide valley which was, thousands of years ago, the bottom of Glacial Lake Missoula. During and subsequent to the existence of this lake, various strata of clays, sands and gravels were deposited on the valley floor. While some of the gravel beds are of open structure and have high permeability, the clay beds were so disposed as to make the gravel deposits generally lenticular in form.

June 1957, spillway section in the foreground handles peak runoff. Living with the river and the weather, a major planning job.

Right—September 1957, shows cutoff wall with work progressing on the southern embankment. Notice new river course



October 1957, shows penstock section in place with river diverted through spillway sections completed in 1956

The net result of the heterogeneous assortment of material overlying the rock bottom of the valley was to provide a reservoir basin which yields a relatively insignificant amount of subsurface seepage around the dam.

Construction

A rock island originally existing in the river was used as an anchor in the cofferdamming procedure. The north channel was first cofferdammed and unwatered and a portion of the spillway was constructed. Eight low-level sluiceways, each 12 ft wide and 17 ft high, were left in this portion. These sluices were adequate for low water flow which occurs between August and April. A 200-ft-wide gap was also left in the spillway above these sluiceways for the passage of floods, which occur between April and July. This part of the work was accomplished in 1956.

The relocation of 17½ miles of main line railroad had to be completed in time to permit other work in the vicinity of the dam to be done between the completion of the relocation work and the high water runoff in the spring of 1958. In addition it was necessary to relocate six miles of state highway, and about 20 miles of county and forest service roads. Facilities of the Rural Electrification Administration, telephone companies, telegraph companies and similar items also had to be relocated.

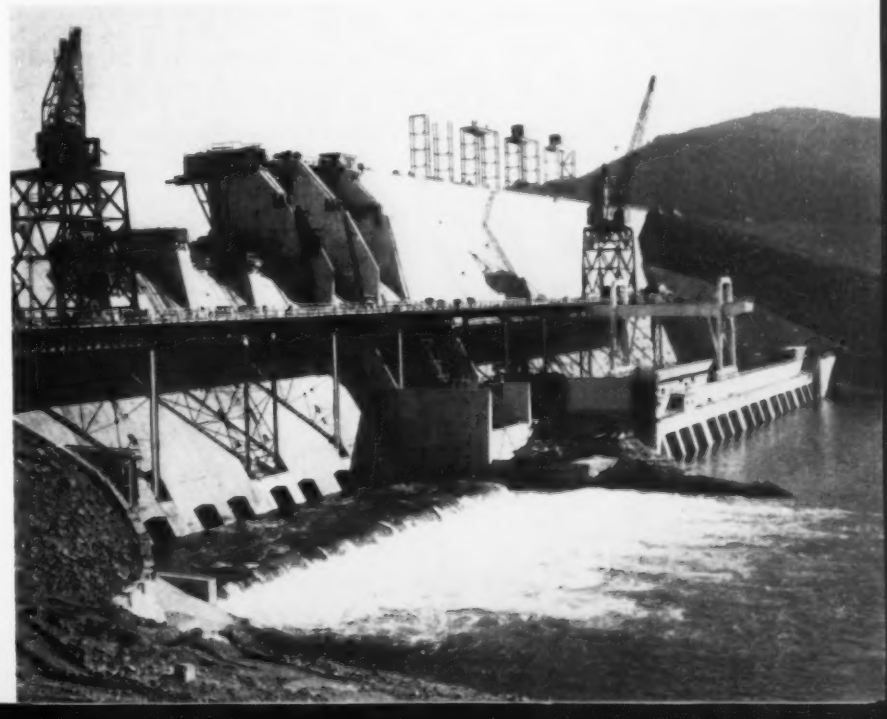
The contractor cofferdammed and partially unwatered the south channel early in 1957. These cofferdams were breached to allow passage of the 1957 flood. In June 1957 the south channel cofferdams were restored and work was concentrated in the intake and power house area. Before April 15, 1958, all parts of the dam except the low gap in the spillway previously mentioned were raised to at least elevation 2240, which forced the flood of 1958 through the spillway sluices and gap. After the 1958 flood, all parts of the dam were raised to practical completion by April 1959. The final closure was made by dropping sluice gates in the diversion sluices during the rise of the 1959 flood when the flow reached 35,000 sec ft.

Dam Details

The most suitable form of dam was found to consist of two earth-fill wing walls located on either side of a central concrete structure made up of a spillway section and an adjacent nonoverflow gravity section. The over-all length of the dam is 5,850 ft and the maximum height of the dam is 265 ft, including 70 ft in a pothole in the bedrock under the nonoverflow section of the dam.

The earth-fill section on the right bank has bedrock for the foundation of its clay core. Across a deep cut in the rock below the water table, a grouted concrete diaphragm 60 ft deep and approximately 200 ft long was constructed in the natural gravels and sands. This was accomplished by the application of cement grout to create a diaphragm having a nominal thickness of 8 ft. The next 24 ft of the core wall above the grout diaphragm was constructed of steel sheet piling. The normal clay core wall was placed from the top of the steel piles to the top of the dam. The line of contact between the grouted concrete diaphragm and the steel sheet piling, which was also the bottom of the trench excavation and ground water table, was 150 ft below original ground surface.

The left bank wing wall has its clay core founded on a natural clay



September 1958, beginning to take on a finished appearance, both sections of the dam have been raised to design height

January 1959, finished work on the dam perceived as electrical equipment is gingerly fit into place, made ready for testing

blanket extending upstream for more than a half mile. The depth to bedrock under the southwest wing wall prevented the construction of a vertical cutoff through the gravels underlying the clay blanket.

The spillway portion of the dam has a normal ogee section. Eight tainter gates located on the crest of the dam, each 40 ft wide and 35 ft high, will pass 250,000 cfs with water at full pool elevation.

Power House

The power house is located at the toe of the nonoverflow section of the dam adjacent to the southwesterly end of the spillway section. The intakes to the penstocks are of rather unusual design in that the center line of penstock is continued as a straight line through the transition zone to the upstream face of the dam. The entrance co-efficient is held to a minimum by means of a concrete lip provided at the bottom of the intake opening. The elimination of the upper bend inside of the penstock was found, through model tests, to reduce the head loss considerably.

The power house is of the semi-outdoor type with the generator barrels located above the power house deck. The main transformers, lightning arresters and appurtenances are located at the same elevation as the power house deck between the upstream gantry crane rail and the downstream face of the nonoverflow section of the dam. The outdoor gantry crane runs on tracks elevated seven feet above the power house deck on concrete walls. The capacity of this crane is 325 tons for the main hook and 30 tons for the auxiliary hook. The crane is arranged so as to make possible the raising of the draft tube gates by means of the auxiliary hook.

The initial installation in the power house will consist of four units each rated at 100,000 kw at full gate at a net head of 152 ft. Space is available for a fifth unit.

The turbines have a specific speed of 69.5 rpm, which is appreciably higher than usual practice. The runners were developed through special scale model tests at the manufacturer's plant. The major criterion on these tests was the mitigation of vibration with little concern regarding the amount of damage due to cavitation.

The scroll cases are constructed of T-1 steel.

Station Facilities

Each penstock has its own intake gate operated by an individual hoist.

An elevator provides vertical transportation from the top of the intake portion of the dam to the operating floor of the power house.

A roadway for private traffic crosses the top of the dam.

An access gallery extends for the entire length of the concrete portion of the dam. Upon completion of construction, grouting of the concrete to rock contact and the regrouting of the bedrock was done from the access gallery.

The power house will be heated by a heat pump utilizing waste heat from the generators. The same heat pump will cool the control room during warm weather.

An unloading platform at the southwesterly end of the nonoverflow section, at crane deck elevation, is served by a railroad spur track and by the gantry crane.

Transmission Facilities

Three single-phase transformers are provided for each two generators. The 230-kv take-offs are carried up the face of the dam to supporting structures and thence to the switchyard located on the left bank just downstream from the dam.

Transmission lines extend from the switchyard to the Cabinet Gorge plant of the Washington Water Power Co. located some 20 miles to the northwest on the same Clark Fork River and to the Pinehurst substation of the company near Kellogg, Idaho. A connection is made to the Bonneville Power Administration transmission line at the dam site.

By means of these connections, the power and energy will be carried to critical points of distribution within the Northwest Power Pool. It is estimated that the energy to be added to the system by the Noxon Rapids development will be 1,714,000 mwh per year during a median water year.

February 1959, as winter slows work, dam takes on completed appearance

G-E's Lynn Wetherill shows how standardization, computer design . . .

Trim Power Transformer Costs

General Electric Co., power transformer department, has announced a sweeping program of power transformer standardization extending to units as large as 250,000 kva and voltages to 230 kv. The program, which they call the preferred design, offers an average price reduction of over 5%, with savings of 20% for equipment in the 230-kv class. Applying these savings to next year's transformer purchases, J. W. Seaman, general manager of the power transformer department, says the industry will save $10 million next year if it accepts the preferred design concept. G-E officials seem to feel that acceptance will be high since PD ratings will satisfy 86% of the country's preferences—based on a survey which was used to plan the PD design.

In addition to attractive dollar savings, the new design offers a 15% reduction in core losses for forced oil cooled transformers and a 10% decrease in load losses for other types of cooling.

Also of growing importance, the sound level of all PD units will be below 1958 NEMA standards three to five decibels—a decrease of 50% or more in sound energy output.

PD units in the higher voltages will have reduced BILs of one, one and a half or two steps.

The reasons for these startling results are two-fold. The first key is mechanical standardization. Armed with a nation-wide survey of customer preferences, G-E engineers standardized the general shape, tank height, location of bushings, coolers, tap changers and controls. This makes the use of auxiliary devices, such as forced oil coolers, applicable to any rating of unit.

The adoption of the standard building block approach carried additional advantages in that many optional devices formerly requiring price additions must now be supplied with the initial package. This includes such items as provision for uprating, provision for CTs, lightning arresters and relays. The building block approach involves a basic (and unrated) transformer to which can be added self-cooling equipment, one stage fan cooling, forced oil cooling or a combination of forced oil and fan cooling. In addition, where specified, the unit can be built for future additions of load tap changing equipment.

The second key is the use of electronic computing equipment to design with tremendous speed and apparent effortlessness an **optimum design** of power transformer from a **minimum** of standard parts. Both the mechanical standardization and computer design were necessary to effect the program. Without the computer the advantages of mechanical standardization would be lost in the costly engineering required to optimize the design with the inflexible standard components.

The design speed inherent in the new system makes it possible for the General Electric Co. to include with it the proposal drawings approved for construction so that the customer can immediately start construction. Additionally, a reduction of 40% in shipping time is claimed as a result of the new program.

General Electric executives claim that, in addition to holding the line on electrical equipment prices, the PD program will enable them to use their top engineering talent for creative and developmental work rather than for routine design.

Scope of Preferred Design Transformers

I. Large substation transformers

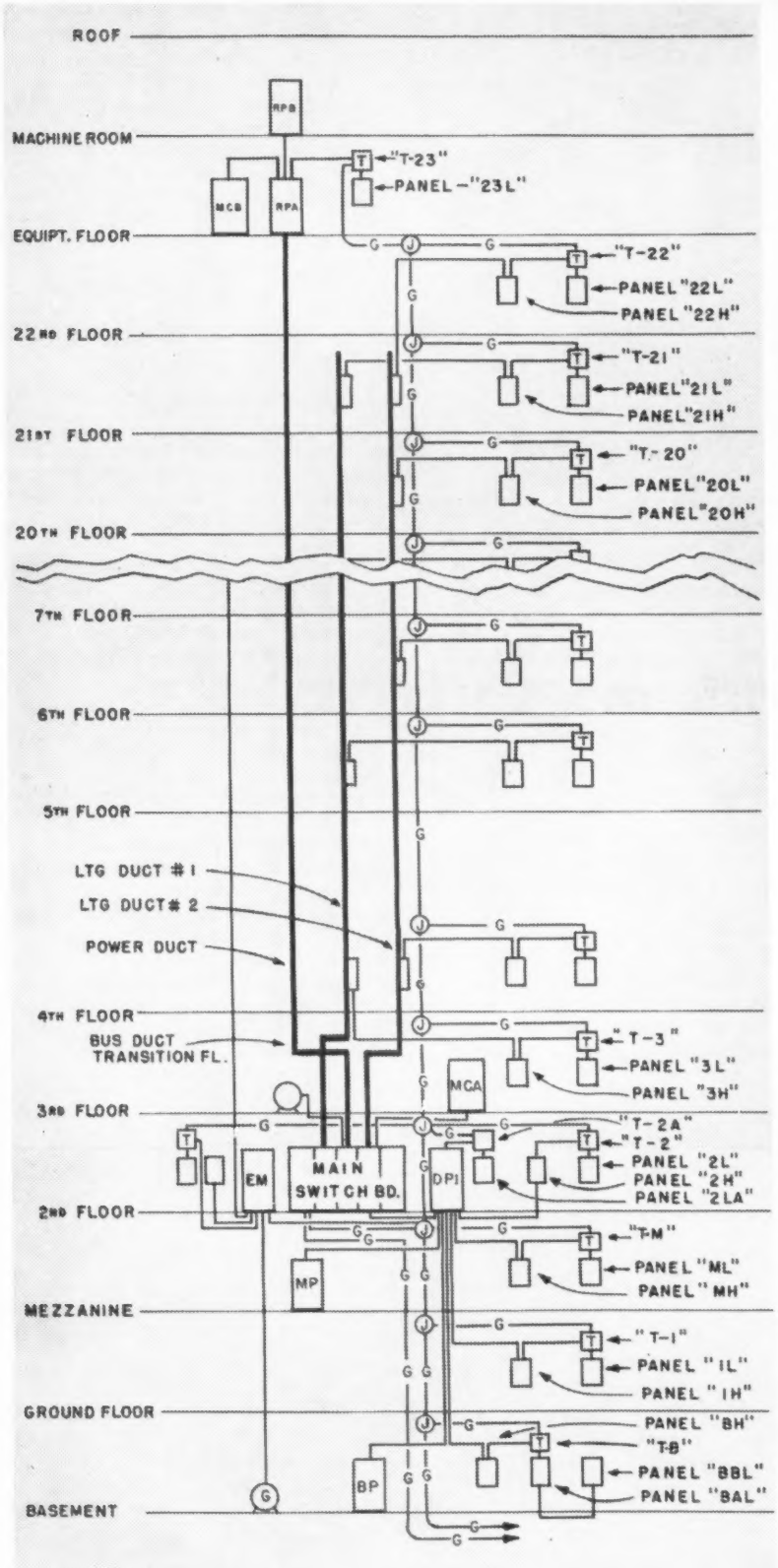
All three phase, two winding, 60 cycles
Four types of cooling: OA/, OA/FA/, OA/FA/FOA, and FOA
Capacities from 12,000 to 50,000 kva
High voltages, 69 to 161 kv nominal
Low voltages, 12 to 34.5 kv nominal
Three standard connections; load tap changing optional on units with ground-wye LV connection

II. Transmission tie autotransformers

All three phase with delta tertiary, 60 cycles
Four types of cooling: OA/, OA/FA/, OA/FA/FOA, and FOA
Capacities from 24,000 to 75,000 kva output
High voltages, 115 to 161 kv nominal
Low voltage, 69 kv nominal
Tertiary voltage 2.4 to 15 kv, suitable for incidental loading
Grounded-wye connection; load tap changing optional on all units

III. Generator step-up transformers

All three phase, two winding, 60 cycles
One type of cooling: FOA
Capacities from 60,000 to 250,000 kva
High voltages, 110 to 230 kv nominal
Low voltages, 12 to 23 kv nominal
Grounded-wye to delta connection



Pre-design planning gives

More

Charles Krieger
Consulting Engineer, San Francisco

Planning main switchboard, transformer vault and mechanical equipment locations at the beginning of design of the architectural portion of a building can save the owner money and result in a better overall distribution system. Another item of importance is imagination, when it comes to initial design. The American President Lines (APL) Building can be cited as a good example of coordinated design planning between Anshen & Allen, architects; Eagleson Engineers, mechanical and plumbing design; Pacific Gas and Electric Co.; and electrical design by the author.

First Approach

As originally contemplated the building would have two 4,000-amp, 265/460-v services so that a full 10 w per sq ft of leasable area could be provided to keep pace with current trends. As initially planned the transformer vault and main switchboard would be located in the basement with two 1,600-amp bus risers for tenant lighting and receptacles, one 1,000-amp riser to the roof for elevators and miscellaneous mechanical equipment and one 1,600-amp bus riser to the second and third floor mechanical areas, and a feeder for a possible second-floor kitchen, plus additional miscellaneous feeders. After checking the cost of bus ducts for this conventional design and realizing that the bus ducts from the basement to the second floor were not serving any useful purpose except for conducting electricity over a long, expensive distance, it appeared logical to relocate the transformer vault and main switchboard to the second floor.

Shorten Bus Runs

The final design had the transformer vault, main switchboard and

One-line riser diagrom shows how arrangement of equipment on second and third floors reduces bus runs

Electrical Capacity for the Dollar

all building fans on the second and third floors, either immediately adjacent to or directly over the main switchboard room, and the 720-hp air conditioning compressor directly over the transformer vault. In this way all large feeders, including service ducts, were kept to a minimum.

The vault was located directly over the truck loading area so that transformers can be lifted into the vault through hatches in the floor, directly from flatbed trucks. These hatches are louvered and serve as air intakes for vault ventilation. The truck loading area is provided with a metal screen roll-up door so air can circulate freely into vault when loading area is not being used.

Paver to Grow on

Tenant services consist of two 1,-600-amp 277/480-v low impedance plug-in bus ducts. Each bus duct is provided with two plug-in provisions at each floor; a 150-amp plug-in breaker with 200-amp current limiting fuses (sized to protect 277-v, 20-amp lighting circuit breakers) serves a 277/480-v lighting panel on each floor with capacity of 10.8 w per sq ft. This panel in turn subfeeds a 45-kva, dry-type, step-down transformer that feeds a 120/208-v receptacle panel with a capacity of 4.5 w per sq ft. Panel capacity is based on an expected floor demand of 2.4 w per sq ft of lighting and 2 w per sq ft for receptacles. An additional 6.4 w per sq ft can be obtained from 277/480-v and 120/208-v panels by use of spare circuit breakers. Large spot loads, such as IBM equipment, can be "plugged" directly into bus ducts at load locations. In order to select proper bus duct, each bus duct is provided with an ammeter in the main switchboard; in this way bus ducts can be equally loaded or loads easily shifted to accommodate added loads.

Total incoming building capacity is 22 w per sq ft. Tenant feeder capacity is 12.7 w per sq ft, mechanical equipment is 7.5 w per sq ft, miscellaneous capacity for future kitchen, etc., is 1.8 w per sq ft.

"The architect is the key figure in making pre-planning work. By bringing the consultants into the picture before the final allocation of space, he opens the door to real dollar savings."

Both lighting plug-in ducts are so designed that the majority of length is used for vertical runs through closets, a very small portion is used for horizontal runs from switchboard to riser locations. Both these ducts are extended full capacity up the full height of the building for quick emergency interconnection of both ducts at top floor, in case of failure of one of the two incoming services.

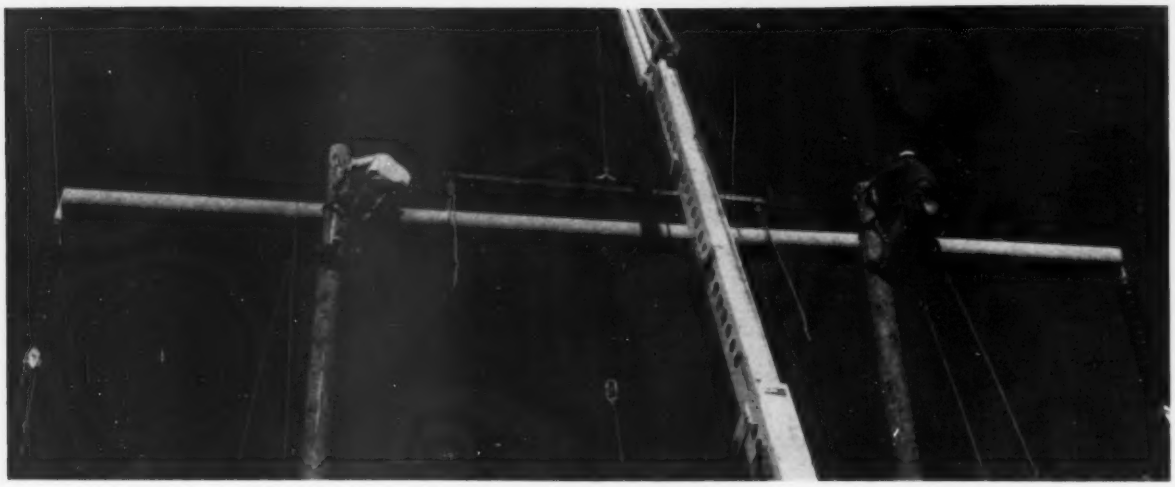
Electrical systems on each floor are so designed that all 277-v wiring is in conduit in the ceilings; all 120-v wiring is contained in the "Q" floor. Q floors are designed for three systems; electric, telephone and for miscellaneous systems (TV, intercom, etc.). In order to accommodate the increased cable sizes and number of cables that might be required by the telephone company with the usage of the new "call director" units, cell interconnections are provided on each floor between the telephone and miscellaneous systems headers and cells, at very little expense to the over-all job, yet the usage of the floor cell system is multiplied many fold.

Lighting Flexible

Lighting system for tenant occupancy was designed with a view toward complete flexibility for future partitioning. The ceiling is a grid lay-in type with 27x54-in. modules. Fixtures are of the same size as modules. All mechanical equipment, pipes, ducts, etc., are positioned far enough above ceiling construction so that a light fixture can be installed in any position in the grid ceiling. Outlet boxes are provided with the basic portion of building and so located that a fixture in any ceiling location can be connected to an outlet with 6 ft of flexible conduit. Junction boxes with 24-v circuits are also located at strategic locations in ceiling for the future installation of low-voltage switching.

One additional cost saving feature was the use of the normal power bus duct for routing emergency power to the elevator penthouse. The emergency generator was designed to handle stairs, vestibules and toilets plus the complete operation of all eight elevators, one at a time. Scheduling of the elevators during normal power outage is accomplished from the building lobby. The 1,000-amp, three-phase, 480-v power bus duct is served from the second floor main switchboard room and terminates in elevator penthouse where it serves the eight elevators plus mechanical equipment on the roof. The emergency generator is connected to this bus duct by means of an electrically operated circuit breaker in the main switchboard with the generator breaker and normal power breaker electrically interlocked so only one breaker can be on line at one time. All mechanical equipment and elevators are controlled by magnetic starters or contactors, with all coil circuits connected through a multipole relay controlled by the generator breaker, so that when the generator is on the line all starter coils are de-energized, stopping all equipment. Each elevator can then be connected to the line by by-passing an appropriate contact of the multipole relay with lobby selector switch. Toilet exhaust fans can also be energized during a major outage by bypassing appropriate contacts.

The estimated electrical cost during design stage was $2.40 per sq ft; actual low bid for this building was $2.18 per sq ft, whereas other similar buildings with less electrical capacity and flexibility have been averaging considerably more.



Above—Held in place by a truck crane, the linemen secure the metallic crossarm to wooden poles. Below—with all of the hardware attached, metal crossarm is readied for the lift

Metallic Crossarms: Will They Cut Maintenance?

A 230-kv power line now under construction near Salem on the Portland General Electric Co. system is making the nation's first use of tubular metal crossarm on H-frame transmission towers. The installation comprises a total of 20 crossarms, including 41-ft tangent structure arms, and 36- and 25-ft angle structure arms.

The new line, which stretches 4.3 miles from PGE's new million dollar Bethel substation on the outskirts of Salem to an intertie with a Bonneville Power Administration line east of Chemawn, uses three types of metal crossarms. One is aluminum, another galvanized steel and the third is of spiral welded steel with a zinc coating.

The utility's examination of tubular crossarms is part of a program to develop maintenance free structures for its service area. It is anticipated that cost of repeated protective paintings and replacement of rot-deteriorated arms will be eliminated by use of tubular crossarms.

PGE officials feel sure the metal will outlast wood crossarms and believe the over-all cost will be cheaper over the life of the project. An argument in favor of the long life metal crossarms lies in the fact that a pole can be replaced without much difficulty but changing crossarms requires much more time and effort.

The utility's experience with this initial installation will determine the extent of future applications.

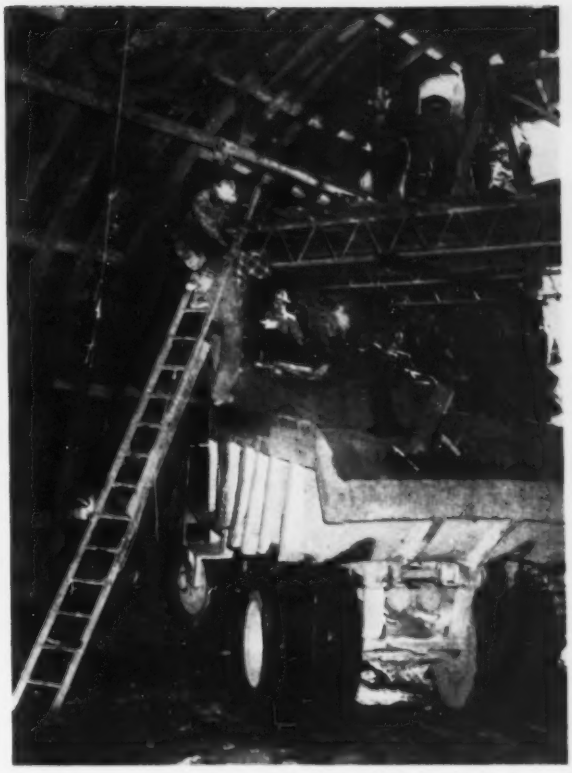
Sky Hook Speeds Tunnel Work At Mayfield

YARDLEY Construction Co., contractor for the power tunnel on Tacoma City Light's Mayfield Dam, has employed a novel system to place the steel rings in the Mayfield power tunnel. An existing power house access road ran directly above the outlet portal about 50 ft above the tunnel. From this road the contractor drilled a line of holes down to the center line of the tunnel roof.

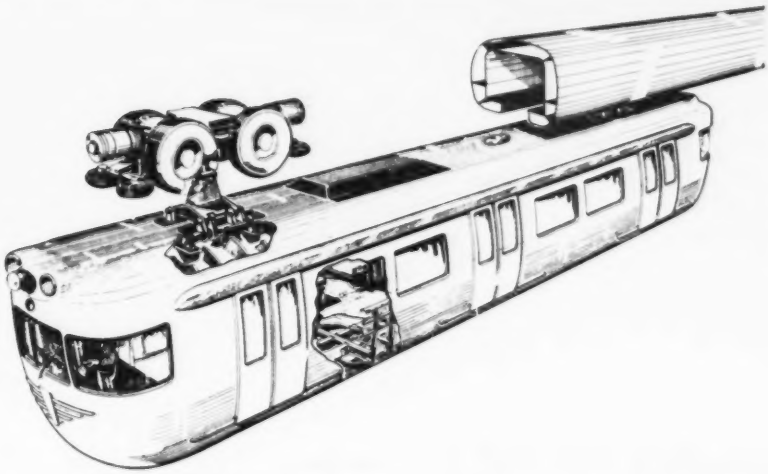
Next, a Bucyrus-Erie truck crane moved over the holes and lowered the hoist line down to the workmen in the tunnel. The haunch pieces were first installed by an Allis-Chalmers H-D 9 front end loader. Then the truck crane, lifting through the hole, picked up the crown pieces, completing the set.

Mayfield will have an installed capacity of 160,000 kw. Its sister dam, Mossyrock, will be built 16 miles upstream and will have an ultimate capacity of 300,000 kw. The costs are estimated by Tacoma City Light at $37,100,000 and $85,000,000 respectively.

When construction was stopped late in 1955, only about 100 ft remained to be bored for the 860-ft-long, 41-ft-diameter power tunnel. Roberts decided to start a small 7-ft by 8-ft pilot tunnel from the other end. He reasoned this would be far less expensive than the installation of tubing and other ventilating equipment to run over 750 ft to the point where miners and chuck tenders would renew drilling.



Above—Truck crane makes ready to lower line through one of a series of holes to tunnel work area 50 ft below. Right—Workmen in the tunnel use sky hook to lift steel members



French Offer Suspended Transit Scheme

A combine of 17 French and international firms has presented the San Francisco Bay Area Rapid Transit District engineering staff and consultants with a proposal for a suspended split rail transit system which might one day take shape in the Bay Area. The French proposal was one of many that the district's engineers must evaluate before selecting the ultimate system. The proposal is in response to the district's request for manufacturers to submit new and revolutionary ideas so that the final engineering can be based on the most advanced concepts. Such proposals will be received during the period of final feasibility and economic studies.

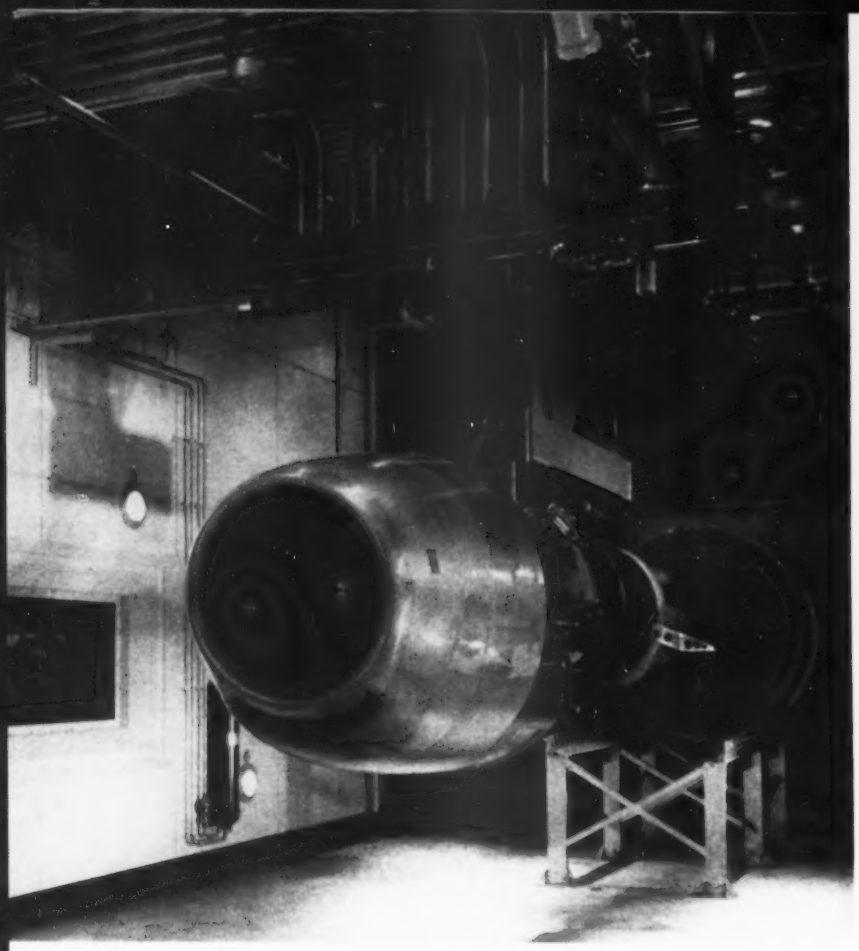
Adding substance to the French proposal is the fact that by the first of the year a one and a quarter mile test line will be completed in France, creating the opportunity to test the suspended equipment in action.

The French coaches will ride on rubber tires, reportedly capable of giving 200,000 miles of travel. Units will be electric powered and reportedly sway proof. Using the suspended system, it will be practical to install the lines in the center strip of existing freeways, in subway tunnels, in high density areas and over existing streets. The cars, which can accommodate 36 to 100 seated passengers, will be powered by two 100-hp d-c motors and have a maximum speed of 66 mph. Maximum design grade is 12%. Four to ten cars could be connected to form a train.

Support for the train would be a complex girder that would house all of the power and control wiring, which in turn would be supported by columns placed at 100-ft intervals.

Most transit experts agree that the equipment for suspended systems is inherently more costly because of the requirement for supporting structures. On the other hand, the ability to utilize existing rights-of-way, a clear advantage for the suspended system, may well tip the total cost in favor of the suspended system.

While there has been no specific or implied endorsement of this particular system, there is a clear feeling that the proposal was conservative and well thought out.



Vibration and explosionproof wiring was required for test cells of United Air Lines for

DC-8 Jet Engine Tests

In preparation for the DC-8 Jet Mainliner service, United Air Lines added to its maintenance base in San Francisco two jet engine test cells. Electrical facilities in these provide means to check out the complete electrical system of the jet engines prior to installation and after each overhaul. Because of the high energy output and the noise, the electrical facilities as well as the acoustical ones had to be designed to take care of the unusual conditions under which the test cells operate.

The test cells are all-concrete structures 106 ft long, 36 ft high, joined by a control room in which the electronic instruments report the performance of the engines under test. They are likewise joined by a preparations building in which the engines are fitted with instrumentation in preparation for the tests in the soundproofed test cubicles.

Four types of electric current are used in the facilities. In addition to the 440/120 60-cycle for building power and lighting, there is installed a 400-cycle converter at 115 v. To get 28 v at 400 cycles, an instrument transformer in one of the panels in the control room provides this supply. Likewise, 28-v d-c is obtained through a 100-w selenium rectifier of the plate type.

Each engine has as part of its components a 400-cycle a-c generator, 20-kva capacity. These generators provide the power for the airplane in order to reduce the size and weight of the motor equipment.

In each cell a termination plate is mounted rigidly just above the engine test mount to which the cables and instrumentation circuits from the engine are tapped through Cannon plugs. This is to simulate conditions on the airplane itself. Circuits from the termination plate are run in conduit through the heavy concrete walls into the control room, which is located between the two cell blocks. In the control room are the instrumentation panels from which the four parameters of information are gathered: fuel flow, water flow and two stages of rpm are integrated into the transducer preselector and then through the regular Eput counter from which the individual in-line read-outs process the information.

To isolate the control room completely from the noise and vibration of the engine test cells a one-foot air space is maintained between the buildings. However, to observe the operation of the engines within, a 3-in.-thick bulletproof plate glass is mounted in the heavy concrete wall of the test cell and just opposite it a 1-in. plate glass in the wall of the control room. Between them is an air space to further absorb any sound.

Elaborate means are provided to control and diffuse and absorb the sound given off during the engine tests within the engine cells.

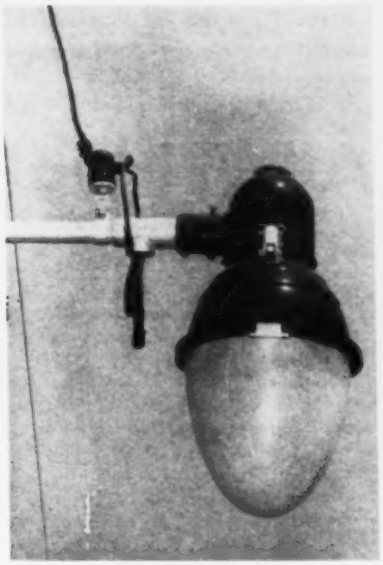
Lighting inside the test cells likewise must be resistant to the shock and vibration. Especially designed vibration proof units by Crouse-Hinds are built into the concrete wherever possible. Every nut and bolt must be vibrationproof and as much as possible of the equipment is tack welded so that it will not loosen and be sucked into the engine during the test.

An elaborate fire-fighting system is also controlled from the control room. A water-deluge system, however, is activated from sprinkler heads. This is fully automatic and operated from thermal heads in the surroundings. Fog nozzles are controllable from the central console and are aimed at the engines. A preventive floor flushing system to wash out spill of fuel from the floor is manually operated.

Likewise operated from the console of the control room are the fuel lines and water lines. Outside the test cells are fuel and water storage tanks as well as compressed air for starting. Electronic turbine-type flow meters for fuel and water control are used and are automatically switched by the Beckman equipment in the control panel. Two large air storage tanks at 100-lb pressure are bled to 45 lb for the starting pressure.

The preparation room has standard industrial fluorescent lighting units operating at 277 v from dry-type transformers.

The test cells were designed by Albert Kahn & Associates of Detroit, built by Western Knapp Engineering Co., San Francisco, and the electrical installation was made by Ets-Hokin & Galvan.



Appearance and light transmission equal

Glass fibers seal bullet holes, mayor and city manager shown by George Hanawalt

Rock and rifle breakage costs $50,000 a year . . .

Are Plastic Globes the Answer?

Shattered street light bowls and lamps, one of the utility company's costliest problems, may have found a solution in experiments by Southern California Edison Co. with plastic enclosing bowls. Roy Dahlin, Edison lighting sales engineer, estimated that his company spends approximately $50,000 per year for replacement of bowls and lamps damaged by rocks, pellets and small-caliber bullets. In addition to this, they are a safety problem to work crews, pedestrians and automobiles.

To find a plastic globe that was shatterproof and yet had the light transmission properties necessary, and one which would resist discolorization and sunlight deterioration, was not easy. Such globes have to take temperature changes from roughly 350° to a -20° and withstand the sudden shocks of rain on the hot globe.

A chance remark by George Hanawalt, Edison's San Fernando district manager, to J. A. Kramer, president of Plastic Age Sales Inc., set the latter company to work to find a bowl that would withstand such conditions. A new and largely unoccupied industrial tract in San Fernando was experiencing a shattering of lamps at a rapid rate despite police stakeouts.

A special formulation of a modified polyester resin reinforced with fiber glass was molded under 200-ton pressure at approximately 300°F. These survived an immersion test in 180° water, a weatherometer test equal to three years of weathering and a high-intensity ultraviolet fadometer test equal to five years of sunlight. For the thermo-shock test, they were baked in a 350° oven, then frozen in -20° cold and immediately put into a 350° oven. They were shot with .22 long-rifle bullets and BB pellets and smacked with hard-thrown rocks. For four months they had 6,000-lumen and 10,000-lumen lamps burning in them while mounted inside a building with little chance to dissipate the 250° heat. Their light transmission properties were compared with glass. The bowls were dropped from 40-ft heights. They passed the test.

Several fringe benefits resulted. One is weight. Plastic bowls weigh 1 lb compared to 10 for glass. They can thus be packed, shipped and warehoused in cartons of a dozen, which one man can easily lift. Maintenance men replace them much more easily and safely. The chopped glass fibers seem to reseal bullet holes and prevent insects from entering.

More than 2,000 have been delivered to the Edison company and approximately 10,000 are expected to be used in new installations during the year.

Broken globes cause many work injuries

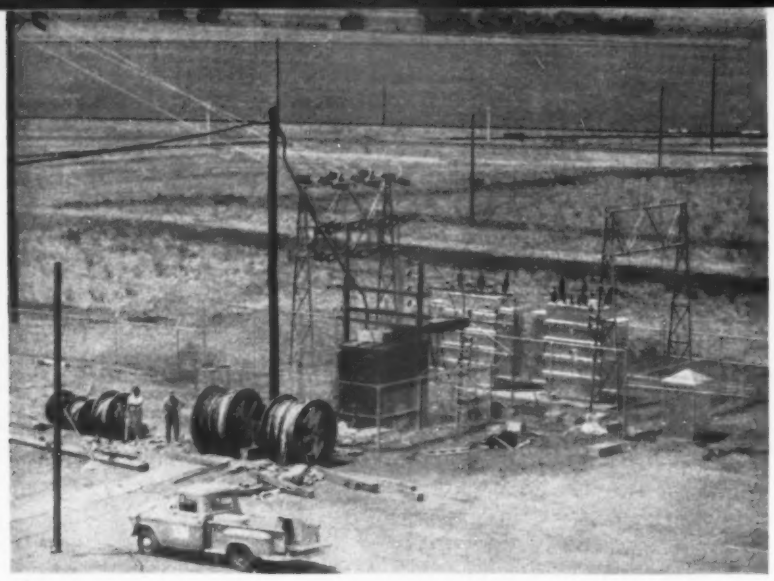
Corrosive and explosive conditions cause contractor to install . . .

All Wiring Above Board

Wiring for heavy current density to a chemical process plant where both explosive atmospheres and highly corrosive ones required very special handling and techniques proved a most unusual project for McCrory Electric Co. of Fresno.

The new plant of the Valley Nitrogen Producers Inc., financed by a cooperative of farmers at Helm, Calif., 30 miles southwest of Fresno and near Coalinga, was the job. It was constructed by Chemical Construction Co. of New York City, engineering department.

From natural gas as a raw material and compressing nitrogen from the air, the firm manufactures anhydrous ammonia, ammonium sulfate and later will process ammonium phosphate. A by-product is sulfuric acid. The plant is processing 150



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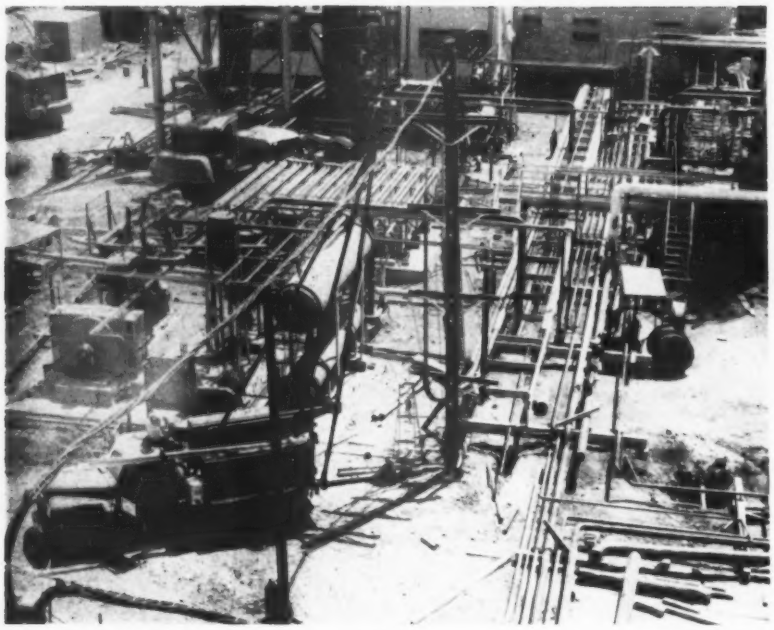

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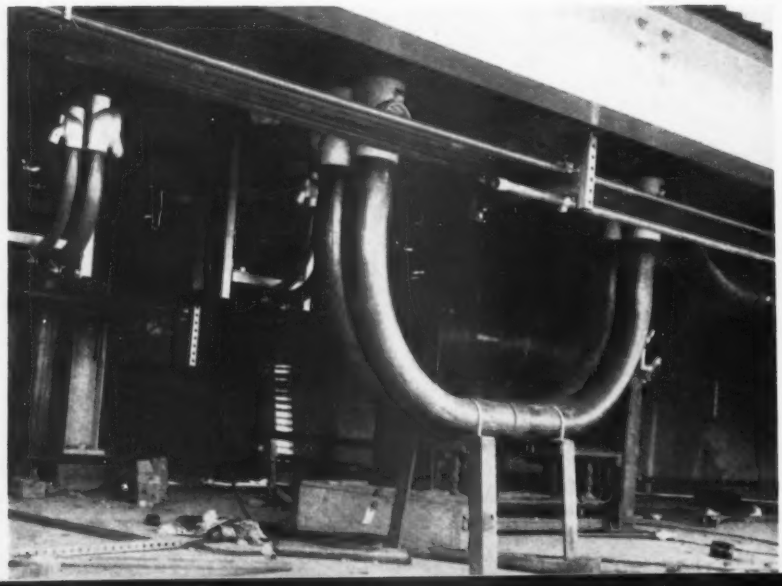

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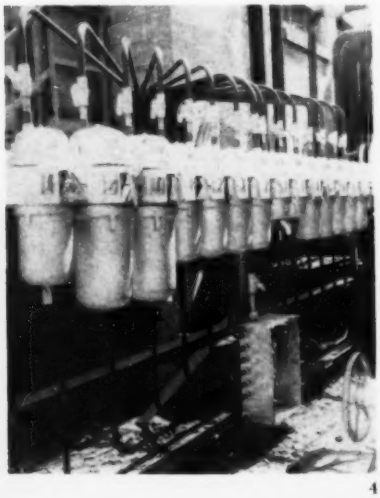

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1. From the incoming substation three-conductor aerial cable was run on 40-ft poles to the plant substations. 2. Aerial cable run to a pole then down to 5-in. conduit racked above ground to switching center. 3. Conduit racked under floor of switch house. Note 5-in. conduit elbows to loop between main switch and panelboard above, fitted with seals. 4. Below, a bank of explosionproof motor starters outside

tons a day of anhydrous ammonia, a very potent farm fertilizer.

Because of the corrosive nature of the process and the probability that the soil will become impregnated with sulfuric solutions, all of this wiring was kept above ground. From the main substation receiving power at 12,000 v, power is carried at 4,160 v to three smaller substations of 750 kva each. The main sub has a capacity of 3,750 kva.

To do this, overhead preassembled cable is to run on poles 40 ft above ground. The cables are made up of three 500-mcm conductors of insulated aluminum on a messenger cable. There are two runs of the 500 mcm and one with a 350-mcm aerial cable. The substations step down the 4,160 to 480 v to feed approximately 100 motors of from 200 hp down to ½ hp. Two 2,500-hp compressors, one 550-hp refrigeration compressor and two 350-hp motors for recirculating pumps take the 4,160 v direct.

All wiring for the motor circuits and control circuits was explosionproof of the Class I, Group D, Division II type in the ammonia plant area. Extensive instrumentation is also used. An example is that there were 300 theremocouple heads installed at various locations with circuits run back to the central control house panel.

While the control house panel itself was not of an explosionproof type, it is kept under air pressure so that explosive vapors may not enter the panel and all circuits are sealed off.

The job was in process for 10 weeks under a very close time schedule, requiring a great deal of overtime work. At the peak there were 70 electricians on the job. John C. Warrick, a member of the firm, Charles Barile, general foreman, R. W. Argo, line foreman, and Harold D. Furnace, job superintendent, pushed the job through in record time from what their men termed "McCrory Electric Western Branch, Helm Division" on a sign over the door of the construction shack.

• National Fire Codes, six in all, including as No. 5 the National Electrical Code and six other standards relating to electrical safety, are available in revised editions at $7 each or $35 for the entire group (which covers combustible materials, liquids and gases, building construction, extinguishing equipment and transportation) from National Fire Protection Assn., 60 Batterymarch St., Boston, it has been announced.

Motors and Controls—VII

Correct Applications

Tom Hughes, Electrical Safety Engineer, California Division of Industrial Safety

Now we have brought you through a devious obstacle course to get this far and we haven't even started to cover protective devices yet. But just to make sure we get the over-all picture, so far, let's briefly outline what we have learned.

Most of our problems with motors are in starting. In starting, the motor must overcome its own inertia as well as that of the load. The inertia of the load can be softened by fluid drives or clutches but not so the rotor inertia. In addition, the rotor fan impellers are providing no ventilation at start; the power factor becomes very poor; and the inrush current produces hot spots in the slots.

For frequent starting, everything must be aimed at reduction of hot spots while producing the necessary torque. **Inorganic insulations such as fiber glass, asbestos and silicones are intended for high ambients due to surrounding circumstances, poor ventilation or totally enclosed cases. They are not to take care of hot spots. Hot spots must be kept at a minimum.**

Greater starting torques are produced with increased resistance in the rotor winding while hot spots are reduced by nothing else but reduction of starting current. Reduction of starting current and consequent minimizing of hot spots are closely allied to correct mechanical application. The more inertia a motor must overcome in accelerating, the greater the shock is to its electrical system.

Thus, higher speed gear motors are the more desirable for frequent starts because of their low rotor inertia. Large, slow speed motors, for driving continuously varying loads, should be coupled through cushioning devices or a clutch.

A glaring example of such a misapplication was the use of an ordinary 20-hp general-purpose motor and magnetic reversing starter to position 20-ton loads of lumber at a sorting table for a lumber processing machine. A limit switch was provided to prevent overtravel. It was estimated that this motor might have to make 120 starts or reverses in one hour (with a new operator). Before this setup had passed the first eight-hour shift it had torn itself up and thrown lumber all over the floor because the copper contacts of the ordinary magnetic starter finally welded closed. Since the holding coil lost control, the limit switch was helpless to prevent destruction before the operator could pull the branch disconnect switch.

The designer probably thought that frequent starts would be of no consequence because the load was applied through such a long gear train. But, please, once more: no ordinary starter (controller) or ordinary 20-hp motor is intended for such service. Even if there were no load, its own rotor inertia is too much for such starting. The correct mechanical application would have been a hydraulic lift with a continuously running motor driving the oil pressure pump.

This illustrates what we mean when we say mechanical misapplication is a shock to the whole associated electrical system. There are other freak misapplications where gravity or kinetic energy can produce an overrunning load and shift the rotor action into a regeneration state with peculiar and damaging reaction at the controls.

Then, of course, there is electrical misapplication of motors. The electromagnetic saturation of the stator varies in proportion to the square of the voltage. Thus the reduction in voltage to 80% of line voltage may reduce the starting torque to 64% of normal. So, when we connect a motor to inadequate supply conductors we aren't fooling anyone but ourselves.

The normal general-purpose motor is rated to operate at 10% plus or minus rated voltage under average load conditions. But most motor applications on our modern machines are not what we could call average. That is the reason for all these special types and styles of motors. So, a 220-v rated motor could be used on regular 208-v line supply if starting torque was no problem and continual operation at full rated motor load was not the normal service.

Another misapplication in the

electrical system is in the sequence of starting motors. Where several motors have to operate at the same time and a few of them are quite large (100 hp or larger), it is only common sense to arrange to start the large ones first. Yet, it is surprising how many people pay unreasonable power bills because they take a murderous maximum demand penalty by starting their largest motors last.

Since most modern machines are being outfitted with their own drive motors by their manufacturer, it behooves the user to ask himself if he is using a machine under the same conditions for which the manufacturer developed it. If it was developed in the east, was it intended for use in the same ambient temperatures as found here? Is the raw material (being processed) of the same texture and grade or is it likely to overload the motor?

If the motor installed by the manufacturer is replaced by a totally enclosed motor it will certainly have to be derated because of poorer ventilation, unless the motor manufacturer has already derated it on the name plate.

The maintenance factor may be another consideration for derating. An example is the refrigerant condenser unit of a refrigerator, which depends on occasional removal of dust and fuzz accumulations. If it is used in an especially dusty location a larger motor may be required.

However, don't overdo this derating of motors. Remember that an unloaded motor is a producer of poor power factor on the system. And any way you look at it: you pay for poor power factor.

And while we are on this matter of application, there is the frequent employment of totally enclosed, fan-cooled motors in dusty locations. The original arrangement in this class of motors included the inner case of the totally enclosed motor and an outer shell or shield with an exterior fan blowing air through the ducts between these two cases. This was developed for explosion hazards or corrosive conditions with vapors and should not be used around dust.

Since the war, the major motor manufacturers have developed another style, in this class, for dusty locations. It consists of the same inner case and exterior fan but no exterior shell. Heavy fins are cast along the exterior of this case to dissipate heat. Thus there are no inner passages (between the two cases) to become clogged with dust, and the surface of the case (over which the fan is blowing the dust) can be observed at all times.

On the other hand, if a motor is placed in a pit, or other location where a break in equipment could completely bury it with material or a pile of sacks may fall over it, it may be advisable to use a totally enclosed, non-fancooled style. Such a style depends on recirculation of its own enclosed air and would take a considerable time to overheat the burying material. This motor is deliberately derated by the manufacturer and, under its full load rating, just doesn't produce as much heat as the normally loaded motor.

DATA ON LARGER FLUOR LAMPS FOR COMML - IND. LUMINAIRES

THIRD REVISION - 5/1/59

LAMP DATA						1-LAMP LUMINAIRE			2-LAMP LUMINAIRE			4-LAMP LUMINAIRE		
TYPE	LISTING	LENGTH	WATTS	M A	LUMENS	WATTS	LUMENS	L/W	WATTS	LUMENS	L/W	WATTS	LUMENS	L/W
RAPID START	F40T12 RS	48 in.	40	430	2700	52	2700	52	94	5400	57	188	10800	57
INST START	F40T17IS	60"	40	425	2600	60	2600	43	110	5200	47	220	10400	47
PREHEAT (STARTERS)	F40T12	48"	40	410	2700	60	2700	45	100	5400	54	200	10800	54
	F90T17	60"	90	1550	5430	111	5430	49	211	10860	51	422	21720	51
SLIMLINE (I S.)	F48T12	48"	40	425	2480	58	2480	42	106	4960	47	212	9920	47
	F72T12	72"	55	425	3800	82	3800	46	144	7600	53	288	15200	53
	F96T12	96"	75	425	5370	101	5370	52	182	10740	59	364	21480	59
HIGH OUTPUT (R.S.)	F48T12HO	48"	60	800	3430	90	3430	38	140	6860	49	280	13720	49
	F72T12HO	72"	85	800	5390	115	5390	47	200	10780	54	400	21560	54
	F96T12HO	96"	105	800	7600	135	7600	56	246	15200	62	492	30400	62
POWER-GROOVE (2 sides grooved) (R.S.)	F48PG17	48"	107	1500	6400	—	—	—	255	12800	50	510	25600	50
	F72PG17	72"	155	1500	9300	—	—	—	370	18600	50	740	37200	50
	F96PG17	96"	215	1500	15000	—	—	—	480	30000	62	960	60000	62
VERY HIGH OUTPUT (R.S.)	F48T12VHO	48"	100	1500	6400	—	—	—	255	12800	50	510	25600	50
	F72T12VHO	72"	150	1500	9800	—	—	—	370	19600	53	740	39200	53
	F96T12VHO	96"	200	1500	14000	—	—	—	480	28000	60	960	56000	60

L/W — LUMENS PER WATT INPUT INCLUDING BALLAST LOSS., SOME DIFFERENCES EXIST BETWEEN MNFGRS, THESE ARE AVERAGES LUMEN FIGURES IN ALMOST ALL CASES ABOVE, FOR "STANDARD WARM WHITE" LAMPS, AND FIGURES REPRESENT AVERAGES OF 3 MANUFACTURERS LATEST BULLETINS.... EXAMPLE: F96T12 WW SLIMLINE: A-5675L B-5340L C-5100L = 5370 AVERAGE FOR OTHER LAMP COLORS MULTIPLY FOR WHITE × 1.00, COOL WHITE × .98, DAYLIGHT × .92, DELUXE × .72 (APPROX. ANSWERS) WATTS GIVEN FOR POWER GROOVE AND VHO FIXTURES COVER OUTDOOR TYPES BALLAST LOSSES. INDOOR FIXTURE WATTS 5% LOWER, IN MOST CASES. * A NEW VHO BALLAST SOON EXPECTED WHICH WILL RATE LAMP 15,000 LUMENS.

Compiled for ready reference by Pacific Gas and Electric Co., this chart combines ballast loss with lamp wattage to give a more accurate "lumens per watt" figure than catalogs carry respecting F lamps. Copies were distributed to contractors and engineers

ELECTRICAL WEST
Construction News

For
- -contractors
- -consulting engineers
- -lighting engineers
- -wiring designers
- -distributor salesmen
- -all interested

License limitations

Utah's attorney-general ruled that a general contractor may engage in any of the specialty contracting fields involved in general construction. The State Department of Contractors had asked for a ruling before undertaking prosecution of a general contractor who undertook furnace installations without a specialty license . . . Utah cities and counties were advised to quit licensing and regulating contractors since only the state has that power, according to John H. Chase, administrator of the department. State-wide uniformity in this field is desirable, he said. Local governments, however, may license contractors as they do other businesses for fund raising only.

A four-month-old strike of building construction unions at Glen Canyon Dam hinged on a $6 a day subsistence clause which the Bureau of Reclamation refused to recognize after housing and city facilities were built at Page.

Rankin Carl Young, electrical contractor, very active in all industry affairs in Idaho, died Oct. 9, aged 63. He was treasurer for the fourth consecutive year of the Snake River Valley Electrical Assn. At one time he also served as one of the state electrical inspectors.

Date change

Another change in date has been announced for the tri-district meeting of NECA in Seattle next spring. Originally set in April and then later announced for May 16-18, the dates have been set ahead to May 9, 10 and 11, at the Olympic Hotel, in order to avoid conflict with the May meeting of the Council on Industrial Relations.

Presidents of three Western National Industrial Service Assn. chapters were among the 55 who attended the second annual Chapter Officers' Conference of National Industrial Service Assn. in St. Louis, last month. Frank R. Search, owner of Frank's Electric Motor Service, Long Beach, president of the Los Angeles Chapter; Victor J. Hunt, Walker Electric Works, Portland, president, Oregon Chapter; and Harold Patchett, owner, Industrial Electric Co., at Everett, president of Puget Sound Chapter, met Horace C. Blenkhorn (right) of St. Catharins, Ontario, NISA president, in St. Louis.

More raises

Wage rates decided by the Council on Industrial Relations for Santa Barbara and San Diego resulted in a 50¢-an-hour increase package of wages and fringe benefits. The new rates are $4.60 per hour. . . Negotiations are on in Tacoma and Portland.

Puget Sound Chapter, NECA, sponsored Charles Scholibo, Western regional manager, for the chief address at the Oct. 19 meeting of the Puget Sound Electric League. . . The chapter has likewise been active in joint meetings with AGC and AIA in an effort to clarify bidding procedures and practices and contract clauses.

H. T. Gunderson, former assistant business manager of the IBEW local in San Jose, has been appointed industry fund coordinator and coordinator for apprenticeship in the San Jose area.

EMEA changes

William Cline, manager of the Los Angeles General Electric Service Shop for the past four years, has been transferred to Dallas, Tex., as manager of a new shop there. Cline has also been executive committee member of the Electrical Maintenance Engineers Assn. of Southern California and chairman of the 1959 Electrical Maintenance Conference last March.

Lloyd A. Gates, Department of Water & Power, was elected EMEA secretary-treasurer to fulfill Cline's unexpired term and Frank S. Miller, electrical department head, Robertshaw-Fulton Controls, Grayson Division, was appointed to the vacancy on the executive committee left by Cline.

Coordinate teaching

California State Department of Education, Bureau of Industrial Education, has published a report of the second annual institute for teachers of apprentice electricians in the San Francisco Bay area that was held at San Jose City College last June. Besides describing the full procedure, it contains the curriculum recommendations from these teachers which should be of value in other states.

Arthur E. Rowe, custodian since its founding of the San Francisco Bid Depository, retires on Nov. 17 and Jack McManus, who has been his assistant, becomes the custodian at new quarters to be decided upon.

Robert Coleman (speaking) was introduced to the San Mateo Chapter, NECA, membership by former manager W. J. Varley (still manager of the San Francisco Chapter) and Everett Marshall, chapter president, last month. Seated far right is Robert Frank, Varley's assistant on both positions.

WWP Workshop shows teachers and business home economists new . . .

Products and Techniques

Anders R. Brown, sales supervisor, specialty products, for Washington Electric Supply at Spokane, gets ready to show his wares. Bill Lowry, WWP, looks over appliance exhibit

More than 200 teachers, home demonstration agents, grange home economics chairmen and business home economists from a three-state area attended the Better Living Workshop sponsored by Washington Water Power Co. at its new service center building in Spokane, Sept. 26. First of its size and type to be held in that city, the workshop drew attendance from eastern Washington, northern Idaho and western Montana.

Purpose—Work Together

Purpose of the session, according to Kimball I. Jack, vice-president in charge of sales, was to show Northwest home economics people, who in turn are teaching others, the very latest techniques and equipment available to them. "Let us Work Together" was the title of his workshop talk, which sets the theme for the entire proceedings of that day's compact program.

Handling arrangements for the company were Home Economists Peggy Lewis and Dorothy Smith, who reported excellent cooperation from Spokane area dealers and distributors and from appliance manufacturers.

The all-day program started at 8:30 a.m. with registration and coffee. Major appliance displays were set up along the hallways surrounding the auditorium and table appliances were displayed in the building's entrance lobby.

WWP President Kinsey M. Robinson opened the morning session, which was addressed by three industry speakers—John Wood, Calgon's regional representative; Mrs. Jesse Cartwright, Norge home service director, Chicago; Jan Reynolds, Sylvania Electric Products Lighting Division, New York.

Mrs. Bernice Stilwell, Westinghouse Home Economics Institute, Mansfield, Ohio, led off the afternoon session. Other afternoon speakers included Kimball Jack; Adelaide Fellows, Philco home economics director, Philadelphia; Karl L. Bachman, WWP service and publications assistant, who told the history of electricity in the area; Mrs. Lucile Bush, consumer education director, S. C. Johnson & Son, Racine, Wis.

A fashion show by the Bon Marche was a feature of the luncheon hour.

John Wood, Calgon, looks over the program with Dorothy Smith and Peggy Lewis, WWP home economists, and President Kinsey M. Robinson before the opening conference session

Cooperating Firms

Cooperating dealers, distributors and manufacturers: Ball Bros. Co., Bon Marche, Calgon Co., Columbia Electric & Mfg. Co., Crescent Mfg. Co., General Electric Co., General Electric Supply Co., Graybar Electric Co., Hotpoint Co., Inland Electric Inc., Jensen-Byrd Co., S. C. Johnson & Son Inc., Maytag Northwest Co., Montgomery Ward & Co., Prudential Distributors Inc., Roger Cochran Co., Sears Roebuck & Co., Seven-Up Bottling Co., Sunbeam Corp., Sunset Electric Co., A. E. Staley Co., Taylor Distributing Co. Inc., Tel-Electric Distributors Inc., Toastmaster Table Appliances, Tubbs Electric Co., U and I Sugar Co., Universal Table Appliances and Westinghouse Electric Corp.

TWO NEW LOW-COST SYSTEMS IBM 1401 CARD... IBM 1401 TAPE

with stored program speed and ability

Never before has so much powerful data processing ability been built into such low-cost systems! For in these two new IBM 1401 Systems you get features previously found only in the larger data processing systems. With 1401 Systems fewer machine units do *more* jobs . . . at *higher* speeds . . . with *greater* accuracy and reliability . . . at *lower* job cost.

To assure you of more production per data processing dollar, IBM's concept of Balanced Data Processing gives you compatible input, processing and output speeds, backed by unequalled customer service. Drawing on all the experience gained in developing the world's largest and fastest computers, these low-cost 1401 Systems bring you these large computer features:

Solid State Design—and transistorized throughout to give you a compact system with greater accuracy and reliability. This powerful system involves no special construction . . . no air conditioning.

Stored Program—gives you the fully automatic processing of electronic systems. It is the key to simplified, economical operation. Completely flexible, a stored program permits you to switch easily from one type of job to another.

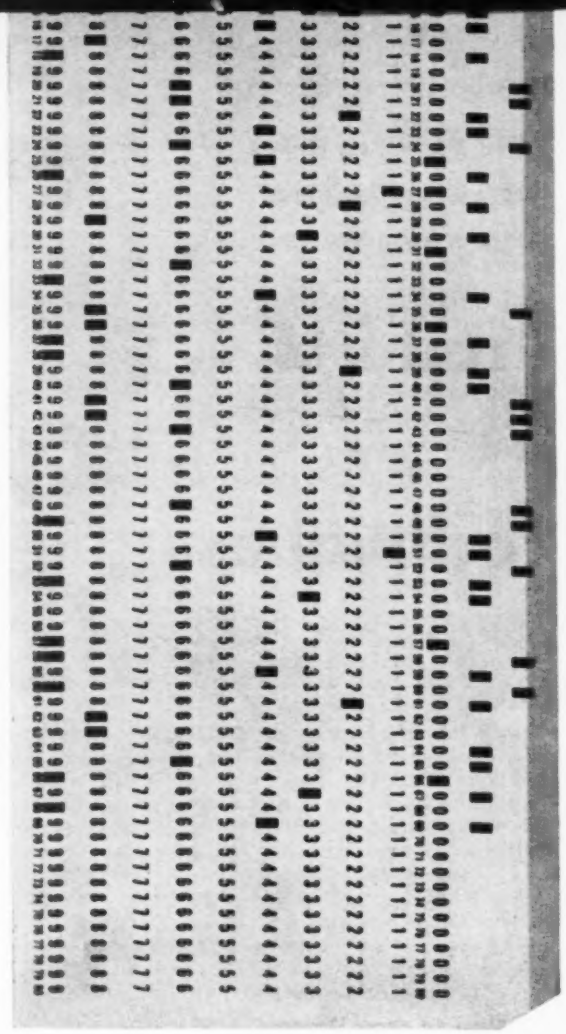
Magnetic Core Storage—the most powerful type storage available. To increase this power even further, the core memory of the 1401 accepts variable-length data and instructions, to permit the storage of only useful information. Choice of 1400, 2000, or 4000 positions of storage means you select the size storage to suit your needs.

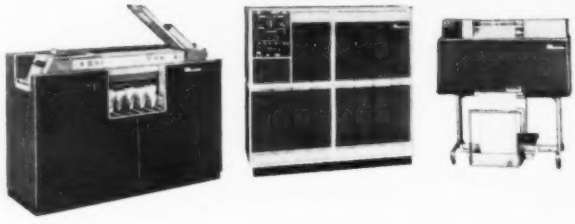
High-Speed Printing—these 1401 systems feature an exclusive new concept of printing. A horizontally rotating chain prints high-quality, perfectly aligned copy. A dual-speed carriage permits printing at the rate of 600 lines a minute, skipping blank paper at 27,000 lines per minute to produce more documents per dollar. Completely flexible editing and print format is provided by the central processor.

Your local IBM representative will explain the many applications and unusual features of the new 1401 Systems. Call him today. These systems, like all IBM data processing systems, may be purchased or leased.

BALANCED DATA PROCESSING

IBM





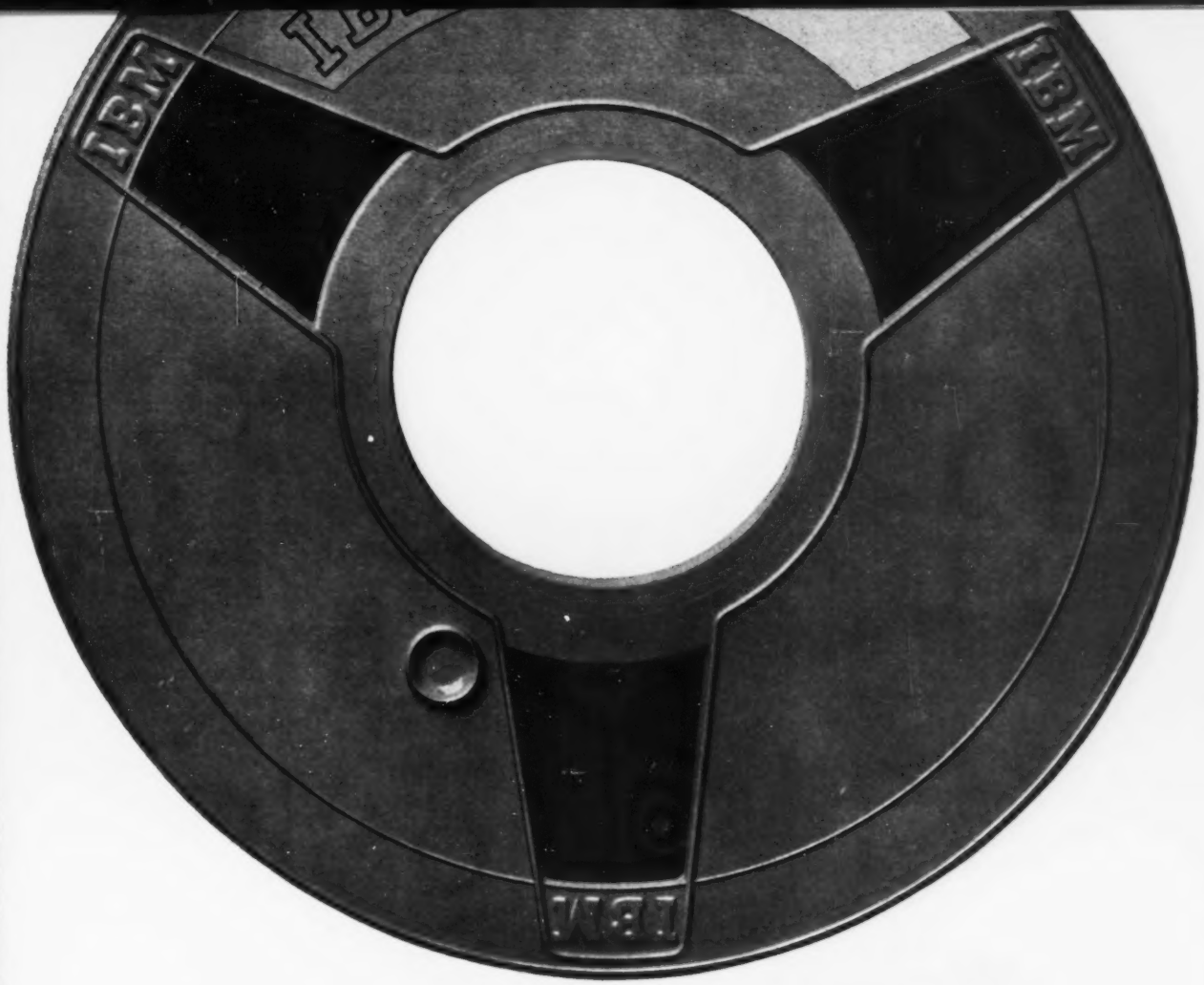
1401 CARD SYSTEMS

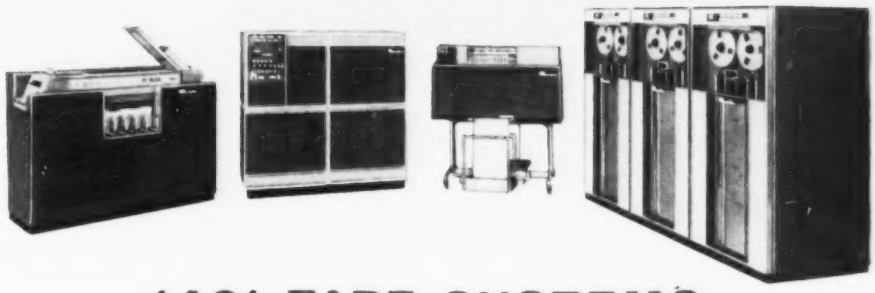
These stored program systems now bring the power of electronics to IBM card systems. They automatically handle the work of accounting machine, summary punch, and calculator, but at far greater speed, and with more flexibility and accuracy.

Input is faster—IBM cards are read into the system at the rate of 800 per minute. Data is processed automatically under stored-program control. Manual card handling is minimized.

Output is faster—documents are printed at the rate of 600 lines per minute, cards punched at 250 per minute. The system will turn out, for example, as many as 230 checks in one minute—again, more documents per dollar through Balanced Data Processing!

Thru-put is faster—data flow is automatically checked for accuracy and speeded all along the line. A unique Card Read-Punch combines card input, output, and summary punching functions. Five radial stackers accept cards that are selectively separated under stored program control.





1401 TAPE SYSTEMS

IBM 1401 Tape Systems give you added power through use of up to six magnetic tape units. These units feed data into the system at the rate of up to 62,500 characters per second . . . record processed results at this same peak speed.

1401 Tape Systems are also extremely valuable as off-line auxiliaries to large data processing systems. They can edit tapes prepared for larger IBM systems. They make possible a tape-oriented IBM 7070 configuration that provides higher speed input and output and makes for job cost improvement.

When tape units are added to 1401 Systems, you get greater flexibility and storage advantages, too. IBM tapes provide extremely compact storage of variable-length records—the equivalent of 129,000 IBM cards on a single reel. Tape records can be of variable length, and are read into and out of the system automatically. Also, tapes can be erased and re-used to minimize your record-keeping costs.

Clark Chamberlain, bureau secretary-manager, discusses plans with newly elected officers, A. R. Combs, first vice-president; Wilma Furstenfeld, second vice-president; Ben Jacobson, president; William Marsden, immediate past president; Jerry Heilbron, treasurer

Human centered approach

Leads to More Sales

In a rapidly changing economy, appliance manufacturers and dealers must gear their operations to customer needs, Herman F. Lehman, general manager of Frigidaire and a General Motors vice-president, told the San Diego Bureau of Home Appliances at its recent fall conference. Some 500 attended to hear speakers from the industry and its allies.

Lehman urged salesmen to use "human centered" techniques, based on consumer attitudes, prejudices, hopes, fears and frustrations. Women influence 80% of major appliance purchases, he said, and while modern appliances have made their lives easier, they also have opened new areas for frustration, including the "misery of choice."

Simplification Needed

Manufacturers should concentrate on designing products that are not unduly complicated, he believes. A woman wants an appliance to be a servant to her; rebels against being its servant. Such features as frostproof refrigerators and easier-to-clean ovens are the type of easy-to-understand selling points that appeal to consumers, he said.

A salesman no longer can take refuge behind a blind wall of product information, he declared.

Another speaker, Forest N. Hall, representative of Chambers Built-ins Inc., Dallas, Tex., said future home furnishings will be built in. He urged dealers to capitalize on sales of built-in refrigerators, washers, dryers, dishwashers and kitchen cabinets.

A change in consumers' attitude toward color television was predicted by LeRoy Bellwood, vice-president and chief engineer of KFSD-TV. He said stepped-up programming, better performance, more manufacturers and better sets would result in more sales.

A panel of five San Diego bankers agreed that "tight money" would remain in effect throughout this year, but would ease after Jan. 1.

Ben Jacobson, president of Cabrillo TV & Appliance Co., was installed as bureau president to succeed William Marsden. Other new officers are A. R. Combs, first vice-president; Wilma Furstenfeld, second vice-president; and Jerry Heilbron, treasurer.

Herman F. Lehman, Frigidaire general manager and a speaker at the fall conference, with William Marsden, outgoing president of the bureau, and Emery Sherwin, president of San Diego Gas & Electric

A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SERIES

Tuition Supplements—

One Good Way To Help Our Colleges And Universities

The business community has made an impressive start in going to the desperately needed financial aid of our colleges and universities. Business contributions to higher education have increased from only $40 million in 1950 to $136 million in 1958.

This rise in financial aid to higher education should be a great source of satisfaction to the business community. But it goes only part way toward meeting the growing needs of colleges and universities for financial help. Over the next ten years business aid to our privately supported colleges and universities alone must increase to at least $500 million a year merely to provide decent faculty salaries and meet the increased operating costs of taking care of enrollments that will almost double.

One pervasive reason why many business firms have not joined the ranks of the companies contributing to higher education seems to be that, in the interest of prestige and public relations, they are making their provision of aid contingent upon finding some particularly novel way of providing it. So long as this point of view persists, business aid will lag, for there are simply not enough ways of providing financial aid that are both notably novel and sensible.*

How The Plan Works

There are, however, some well-tested ways of providing aid which improve rather than fade in appeal with more using. One such way is the making of supplemental tuition payments to colleges and universities at which a company's employees take courses.

Many companies have scholarship or tuition-refund programs which cover all or part of the costs to their *employees* of taking college courses. But, in most colleges and universities, tuition charges fall far short of covering the full cost of the education given. By making an unrestricted "cost-of-education" grant a part of their employee scholarship or tuition-refund plans, these companies could make a material contribution toward covering the *college's* full costs as well.

The tuition supplement can be a fixed amount or a percentage of the tuition charged. Some plans provide for supplements as high as 100% of tuition, though there is usually an upper limit to the total supplemental payment given for each employee enrolled in the institution.

The plan seems to have originated with the Ford Motor Company Fund. When we at McGraw-Hill first learned of it, it appealed to us as having so many advantages, and so few disadvantages, that we adopted it as one part of our own program of financial aid.

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*The efforts of the McGraw-Hill Publishing Company to find a suitable method of aiding higher education prompted the writing of a "more or less Socratic dialog" entitled *A Business Wrestling with the Problem of Aid to Colleges and Universities*. Copies of this pamphlet, which underlines the difficulty of finding both a novel and satisfactory method of providing aid, are available on request.

HOW THE HEADS OF SOME OF THE INSTITUTIONS TO WHICH McGRAW-HILL HAS MADE GRANTS FEEL ABOUT THE TUITION SUPPLEMENT PLAN

"We are pleased not only because this addition to the never adequate supply of non-earmarked funds is a most welcome one, but also because it attests to the fact that the employees of our neighboring business firms are benefiting from the courses we offer at times convenient for them. We hope this mutually beneficial plan may continue and grow with the years."

Grayson Kirk, President
Columbia University

"I shall take this occasion to express deep sentiments of appreciation, in my own name and in the name of the members of the Board of Trustees, for the very effective manner in which your corporation is aiding higher education by the payments made under your tuition supplement plan. Certainly your action is indicative of the fact that you realize industry and higher education must join forces to preserve the basic American system of free enterprise."

Very Reverend John A. Flynn, C.M.
President, St. John's University

"The growing recognition by business and industry of the financial needs and important services rendered to the community by the colleges and universities is most encouraging, and Temple University is deeply appreciative of the fine support extended through McGraw-Hill's program of supplementary grants."

Robert L. Johnson, President
Temple University

The Plan's Advantages

The main advantages of the tuition supplement plan are:

- **It is simple and easily administered.** Payments can be made when scholarships or tuition refunds are granted, or at another time convenient to the company.
- **It relieves the company of the difficult and sometimes disagreeable task of choosing one college rather than another.** The individual employee makes the choice.
- **It directly serves the interest of the company by encouraging and aiding the institutions where its employees take courses.** In a sense, the company makes contributions in direct proportion to the value it receives in education for its employees.
- **It directly serves the interest of the colleges and universities receiving the grants by getting money to them in the form most appreciated**—unrestricted funds to be used at the discretion of their administrators.

Largely because tuition supplements are unrestricted as to use, this plan enjoys the unqualified approval and gratitude of the schools receiving such aid. This is not true of some of the other plans for granting aid to colleges and universities.

Tuition supplements, of course, can't be regarded as large efforts relative to the need of higher education and the responsibilities of business. But they are a very practical and useful first step, involving almost no problems. If you are not familiar with the idea of supplemental grants, why not discuss it with some of your friends in the field of higher education?

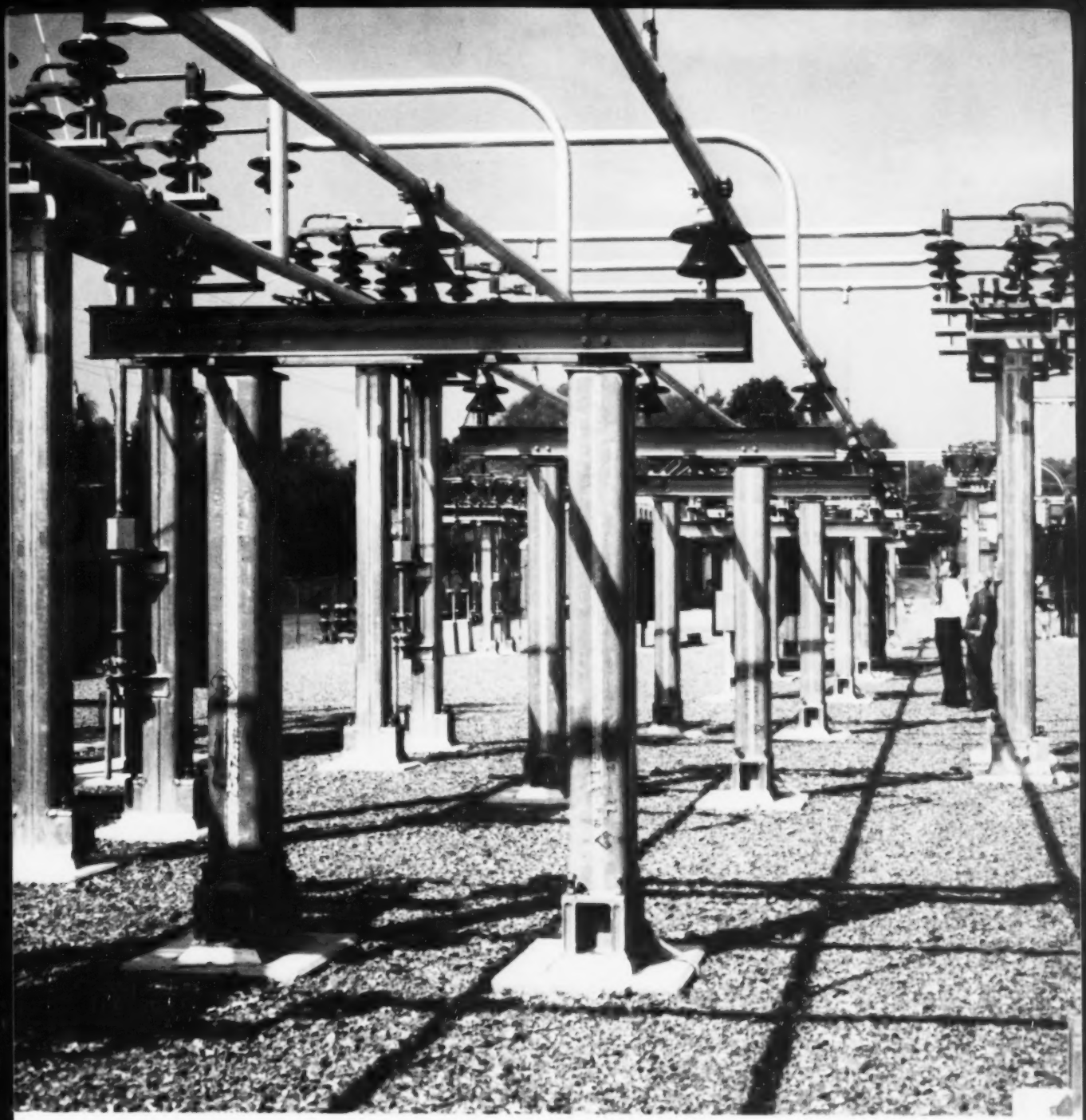
The Price Of Novelty

Our experience with tuition supplements indicates that this is an excellent plan, and we are glad to recommend it to other companies looking for an effective method of providing financial aid to higher education.

At any rate, we hope that business firms will not postpone granting financial aid until they find some novel way of doing it. If they do, it will be another case of too little and too late.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw
PRESIDENT
McGRAW-HILL PUBLISHING COMPANY, INC.



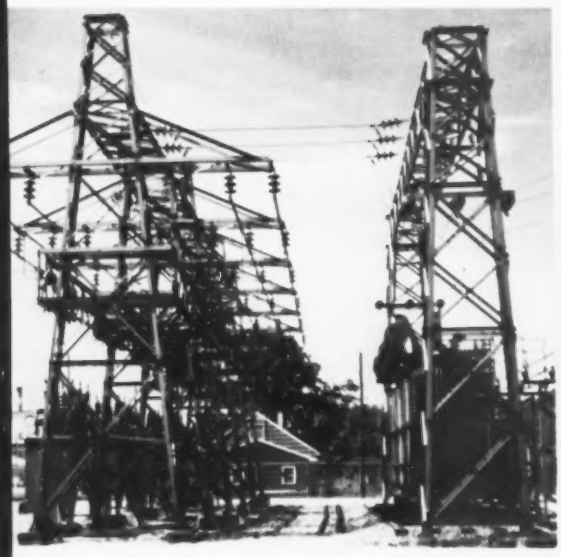
Philadelphia Electric's Bryn Mawr station utilizes a box column design in the structures. Columns were shop-fabricated by welding together two formed plate aluminum alloy channels. Use of aluminum bus also is another step toward an economical, maintenance-free station.

HOW ALCOA ALUMINUM TRIMS COSTS IN SUBSTATION STRUCTURES

ALCOA RESEARCH

. . . development today for tomorrow's loads

ALCOA STRUCTURAL ALUMINUM PROVIDES NEW ECONOMIES IN SUBSTATIONS



Pennsylvania Electric Company's switching yard at Erie is one of the earliest aluminum utility substation installations in the U.S. These aluminum structures are as sound and attractive today as when erected in 1946 . . . without a penny invested for maintenance or painting.

City of Seattle, Wash., Duwamish Substation.

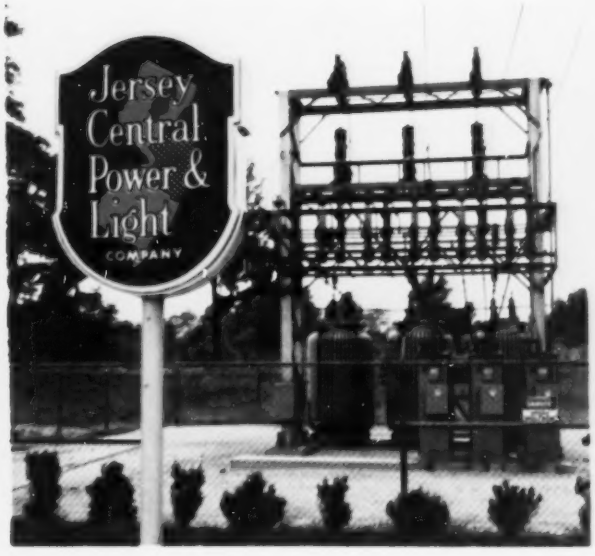
Alcoa research for over 50 years has been devoted to a broad search for new and improved applications of aluminum within the electrical industry. The objective has been singular and unchanged: to reduce costs while advancing standards of performance.

Over 10 years' experience with utility installations throughout the country has proven the many money-saving features of Alcoa® Aluminum for substation structures. Only a third the weight of steel, aluminum is much easier and cheaper to handle . . . often permits erection without any materials handling equipment at all! It can be fabricated with ordinary shop tools. But aluminum's real forte, of course, is its highly corrosion-resistant qualities. Aluminum structures, even where exposed to most corrosive industrial atmospheres, never need painting even after alteration in the field.

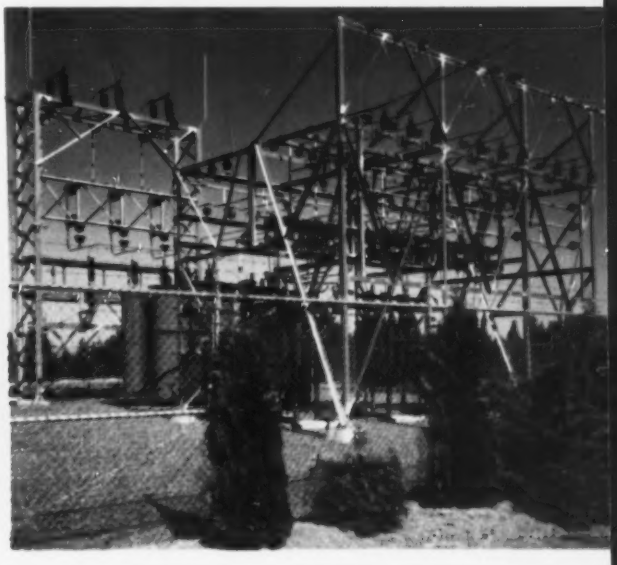
ALCOA ALUMINUM

ALCOA RESEARCH

. . . development today
for tomorrow's loads



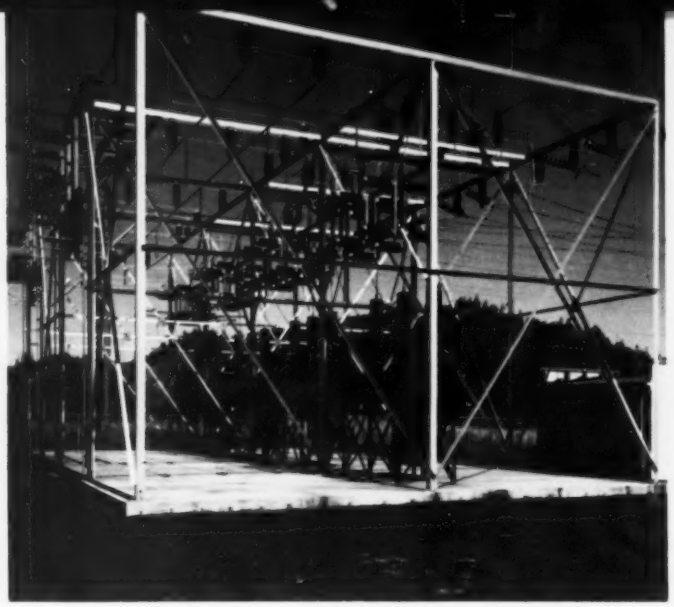
Alcoa Aluminum structures are ideal in coastal areas such as this Jersey Central Power & Light Company station near Laurence Harbor, N. J. Aluminum is highly resistant to the corrosion that causes severe mortality in steel substation structures. Steel in this atmosphere usually requires two coats of paint every five years. Painting near energized circuits creates safety hazards . . . or requires outages for maintenance. Alcoa Aluminum never needs upkeep!



The bright, clean appearance of Alcoa Aluminum gives substations a good-neighbor atmosphere that is so important in suburban areas. Outdoor substations, like the L. M. Jones station of Clarke County Public Utility District, near Vancouver, Wash., present a consistent, like-new appearance over many years when made of lightweight, moneysaving aluminum.

ALCOA SUBSTATION STRUCTURES

. . . EASY TO INSTALL
. . . EASY TO HANDLE
. . . NO MAINTENANCE



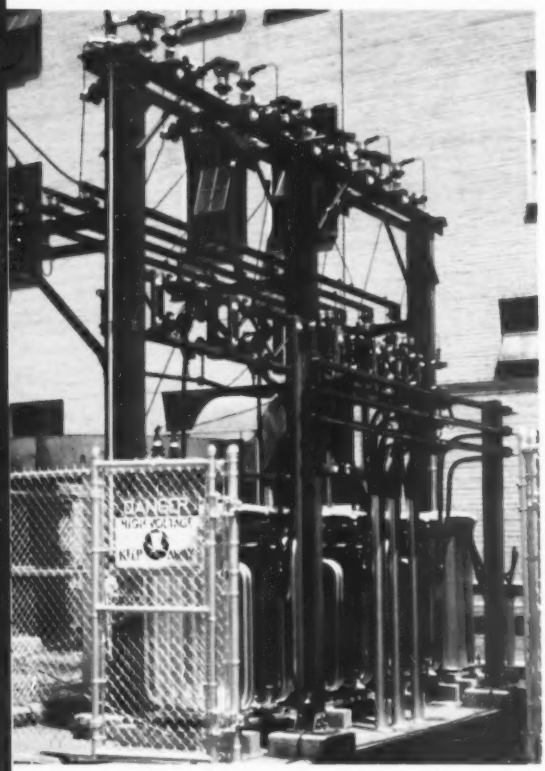
Cowlitz County P.U.D., Mount Solo switching station at Longview, Wash.

First installed experimentally for substations in the early 1940's, Alcoa Aluminum has rapidly gained wide acceptance as a structural material in large and small outdoor substation structures. Hundreds of thousands of tests have been conducted since those initial utility structures were designed to develop stronger, lighter and cheaper alloys that will give maximum corrosion resistance and still keep the bright, new appearance of aluminum.

Savings in handling and ease of erection help make Alcoa Aluminum more economical than any other structural material available. These features, combined with aluminum's maintenance-free characteristic, quickly offset any material price differential of the original structure compared to steel. Maintenance on steel structures in some corrosive atmospheres often equals the original cost during a 30-year span. Alcoa Aluminum requires no upkeep.

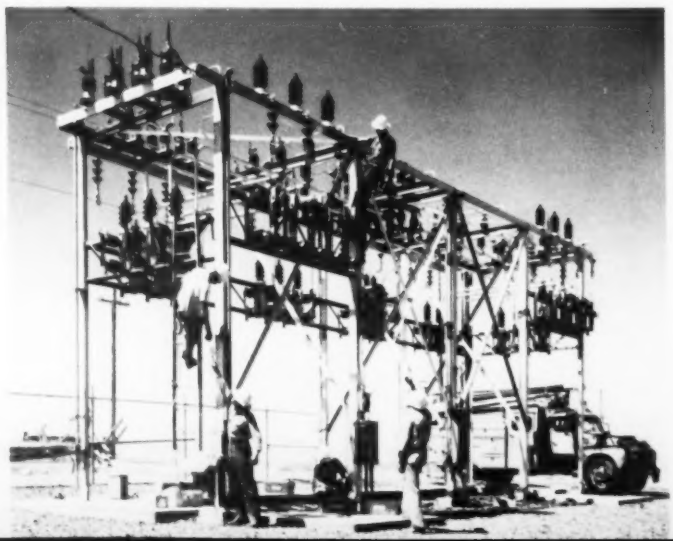
Light enough to be handled manually by the erection crew in most cases, aluminum structures can often be set up without cranes or derricks. Structures can be readily loaded on trucks and carried to the site by the crew.

The excellent electrical conductivity of aluminum is advantageous in facilitating grounding of electrical equipment . . . another saving with Alcoa Aluminum.



The aluminum substation constructed at Alcoa's Research Laboratory in New Kensington, Pa., in 1945 is believed to be the first. Fourteen years of continuous service by this Alcoa pioneer effort has confirmed the economies of aluminum as a structural material. The aluminum is as sound as the day it was erected . . . with no maintenance.

Larson switching station, Grant County P.U.D. near Moses Lake, Wash.



Your Guide to the Best in Aluminum Value

ALCOA ALUMINUM

NELPA president, Tom Ingledow (left), joins Dal Grauer and Al King after their keynote addresses. All agree there should be . . .

"No Border for Power Integration"

The Northwest Electric Light & Power Assn.'s 52nd annual meeting in Vancouver brought into clearest focus the broad community of common interests—and common problems—which members of the group must meet, together and in a spirit of friendly cooperation.

It would be difficult indeed to imagine that the international character of the NELPA organization, in this meeting in particular, would not have lasting effects on future power developments in British Columbia, as well as the beneficial international uses of these developments.

A. E. "Dal" Grauer, president and chairman of the board of the B. C. Power Corp. Ltd., discussed the general economy of British Columbia, then directed his attention specifically to the international aspects of future power developments in the province. His comments were significant—a large portion of them follow.

"I would like at this point to review certain fundamental attributes of big power development.

"The first relates to the waste aspect of water power. Power, in the shape of water, flows into the sea if not used. It is gone forever if not used, unlike natural gas and oil: but also, unlike natural gas and oil, water power annually replenishes itself. Because of these characteristics, water power is something to be developed as soon as possible.

"The second attribute I wish to draw attention to is the economics of power. Power that can be used for diversified residential, commercial and industrial load is much more valuable per kwh, supports many more people and develops much greater taxable capacity than the same amount of power used for an industry of heavy electrical consumption.

"My third attribute relates to the financing of big power projects. The sooner a large hydro project can be brought beyond the break-even point and into the profitable area, the easier it will be to finance it—an increasing problem these days—and the cheaper the over-all kilowatt-hour cost will be. This is particularly true of the Peace River, where over 3 million kw can be developed at one site. By contrast, the high dam on the Columbia is economic, even without a power plant, because of its great contribution to the regulation of the river and to flood control.

"From the point of view that I have just reviewed, there could be a strong case for the export to the Pacific Northwest in the United States of some power from either the Peace or the Columbia, whichever one is brought in first. This would be so if at the time of actual construction the size of the annual increase in electrical load in B. C. alone proved not yet sufficiently large to require the power.

"The annual increase in demand for electrical energy in the United States Pacific Northwest is several times what it is in British Columbia. Accordingly, export would allow the hydro development of either the Columbia or the Peace more rapidly to get to the stage of economic generation and transmission.

"Such export must, of course, be on a recapturable basis, because the longer term growth trends in British Columbia are such that any block of power that is exported around the latter 1960s will almost certainly be needed in British Columbia 15 or 20 years later. Even by 1968, for example, the combined annual load growth of the B. C. Electric and the B. C. Power Commission will be over 300,000 kw, without allowing for any special loads.

"This program of recapturable export should fit into United States planning well, however, because it would permit the postponement of investment in thermal plants or their probable successors, nuclear plants, for a period of years during which nuclear technology will surely improve enormously.

"American utility companies interested in purchasing power from the Peace River or the Upper Columbia should, however, realize that this will not be the cheap power they have become used to since the setting up of the Bonneville Power Authority in 1937 with its charging off of important parts of the cost of generation.

Dr. Lewis: What Candu can do

"Indeed, with a rare exception, such as the downstream benefits resulting from the regulation of the Columbia by dams in British Columbia, there is no place one can turn to now for cheap power in the sense that Washington and Oregon have become accustomed to it.

"With these various considerations in mind, one could experimentally set out a power program for British Columbia embracing the Peace, the Upper Columbia and the Fraser. It could be as follows:

"Whichever of the Peace or Upper Columbia can be brought in first (i.e., engineered, financed and constructed) should be started. If this were the Columbia, the evidence indicates that the high dam (Mica) should be built first—probably with no installed generating capacity—which would at once give the bulk of the downstream benefits and substantially achieve flood control objectives in the Lower Columbia. Assuming something like a 50-50 division of downstream benefits, Canada's share of them would be used up by normal load growth in B. C. in three years or so, a fact that is widely overlooked.

"The next step in a reasoned development of B. C.'s big rivers could, in this hypothetical program, be the Peace River; not only because it has much the largest potential at one site—over three million kw near Hudson Hope, but also because of the importance of its huge storage.

"Accordingly, it would be necessary to start the main dam on the Peace River some three years after the high dam on the Columbia was started; and the construction of the two would therefore overlap. The big capacity of the Peace would allow an immediate export to the United States of something of the order of 500,000 kw for 15 years or so. This, together with the annual increase in British Columbian demand, would enable the installation of several generating machines and the building of two transmission lines, and start the project off on an efficient basis. It would also substantially shorten the period required for the full development of the Peace near Hudson Hope.

"Before this full development occurred, construction would start on one or more of the remaining dams on the Upper Columbia and provision would be made for at-site generation of power on the Upper Columbia, so that there would be no gap when Peace River power was all taken up by export and internal consumption.

"When the at-site possibilities of the Upper Columbia were exhausted by growing British Columbian consumption, the Fraser would be the next obvious development if the fish and power problem were solved by that time.

"There is another important aspect of the power picture that deserves further development before I end; that is the growing importance of interchange of electricity and of storage between the Canadian and the American parts of the Pacific Northwest, respectively.

"Similarly, because load characteristics differ, daily and seasonal trading of electricity has its advantages. Time zones, with their different load peaks, also accommodate mutually beneficial interchange between utility systems.

"Such interchange of electricity and of storage is, of course, a different proposition from the export of power, which is a one-way transaction for the duration of the contract. Interchange is the trading back and forth of power and storage capacity for the benefit of all areas.

"The main dam on the Peace River would create a usable storage capacity of over 30 million acre-ft, some six times that of Grand Coulee, the largest in North America.

"In conclusion, may I say this. There are certain hard facts in the power picture of the Pacific Northwest in Canada and the United States. I have tried to delineate the main aspects of this situation. Certainly nature has been generous, as far as water power is concerned, both to the Pacific Northwest in general and to British Columbia in particular. It is now up to the humans involved. The rivers are big and they have many and complicated problems—engineering, financial and political. The handling of these problems can only be set back by emotionalism, wishful thinking or looking at facts from the angle of predetermined views. What we must have is understanding, foresight, courage and, above all, cooperation."

Allen King, president of the Northern States Power Co. and president of the Edison Electric Institute, traced the development of the electric power industry in this country from its conception. He commented, "In a sense we face a paradox. We seem to be faced with a period of our greatest criticism from public power advocates. We see progress made in Congress toward the slow piecemeal socialization of our business. We do not experience a great deal of opposition to these trends on the part of the general public. A review of our present situation would be deeply discouraging were it not for the fact that the investing public believes in us. People—and I mean just people—are continually expressing their confidence in our industry by putting their dollars to work with us." He suggested that since our companies operate "right down Main Street," why not tackle the serious problem of education on Main Street.

In a revealing look at Canada's nuclear program, Dr. W. B. Lewis, vice-president of research and development of the Atomic Energy of Canada Ltd., began by making clear the fact that Canadian nuclear development had to take into account the fact that Canada as a whole has an abundance of water power, coal, oil and natural gas. Thus, nuclear power, which was not truly economic, would be coals to Newcastle. This condition tempted the Canadians to give serious consideration to a breeder-type reactor which, though technically practical, was expensive. With careful analysis, it was found that the practical program was not a breeder reactor, but a fuel-regeneration type that made it possible to avoid handling the intensely radioactive fission products.

The outstanding features of the Candu reactor are a long burn-up of the fuel, mainly 10,000 mw days per ton of uranium, the ability to change fuel under power, and the ability to use zirconium clad fuel at 550 F and 1,500 psi. Dr. Lewis predicted that the third or fourth reactor of the

NELPA's new executives (left to right). Vice-president Claude Kingsbury, Ohio Brass Co.; Vice-president Frank M. Warren, president, PGE; President George Brunzell, executive vice-president, WWP; Vice-president Olin H. Ririe, assistant to president, Utah P&L; Treasurer Allan F. Elder, treasurer, WWP

Candu type would generate 350 mw and cost less than $250 per ekw, coupled with a fueling cost of less than one mill per kwh.

Championing the cause of the Canadian fishery, James Sinclair, president of the Fisheries Association of British Columbia, discussed the concept of "fish and power." He indicated that the present heavy yield by Canadian fishermen is a testimonial to the voluntary cooperative agreement between Canada and the U. S. He stated that there is sufficient hydro capability in Canada, not involved with salmon, to take care of Canadian requirements until the fish problem is fully solved. He indicated that the diversion of the surplus waters of the Columbia into the Fraser would lead to a great deal of opposition from the fishing industry in British Columbia. He lauded the effective cooperation of the B. C. power industry in attempting to keep abreast of power requirements without injury to the ever expanding fisheries.

L. E. Dake, senior partner of Cresap, McCormick & Paget, drew a bead on the cost setting opportunities that were available to the utility industry by untangling the horizontal down-the-line relationship. He said, "Interdepartment clerical volume appears to grow by some exponential function in relation to the size of a company and its attendant problems of communication. It is a good example of Parkinson's law. It is indeed a principal breeding ground for all the concern expressed by managers all over the country over the growing mountains of paper work. In our experience we have found that about 80% of a company's clerical work is involved in this maze of relationships down the line, but it fills only about 20% of the company's communications needs. The other 80% of the need is handled by the big, obvious, clerical systems that get all of the attention, are thus more efficient and account for only 20% of the clerical load!"

Discussing the problems of orderly industrial growth, General Sir Ouvry L. Roberts pointed to the advantages of planned industrial estates. He pointed out that industrial straits are appealing to industry because they offer ideal conditions under which industry can operate, and also integrates industry into the community without detracting from the attractiveness of the community as a place to live. He pointed out that only by this type of planning can we avoid the tragedy of industrial slums and the corresponding blight on our living areas.

Ian F. McRae, chairman of the board of the Canadian General Electric Co., addressed the group on manufacturing's role in Canada's economy. McRae pointed out that manufacturing is Canada's major industry, responsible for 55% of the nation's total production, employing about 25% of the labor force and directly supporting one-third of the entire population. He added that manufacturing employs as many people as farming, forestry, fishing, mining and construction industries combined, and is the leading industry in seven of the 10 provinces. Against this background he urged that industry and government make sure that the majority of future manufacturing growth is not concentrated only in the provinces of Ontario and Quebec. He said that Canadians should be concerned that 65% of the population and more than 80% of the manufacturing industry are located in these two of the 10 provinces.

He then commented on the effects that import of foreign manufactured goods was having on the domestic manufacturing industry. He said that Canada is the world's largest importer of fully manufactured goods, and added that the nation's import bill per capita was $262 compared with $28 in the U. S. and $48 in Great Britain. He said that 77% of Canada's imports in 1957 were fully manufactured goods. "These figures alone ought to make opponents of adequate tariffs stop and think," he said.

The annual meeting called to order by association president, Dr. Tom Ingledow, formally approved the association membership of the Canadian Utilities Ltd. A wire received during the meeting contained the application of the Calgary Power Co., who was likewise admitted to membership and heartedly welcomed to the association. This brings the total company membership to 11 American and three Canadian utility organizations.

In a precedent breaking action, it was unanimously agreed that class B members (manufacturers) could and should hold office in the association.

At meetings' end, Art Thompson, Canadian G-E, and his hard-hitting committee had every reason to be proud of NELPA's 52nd annual meeting.

After the dance, Hugh James' six-string ensemble entertained the ladies with a program of Bartok

Ken Rehwaldt and Ralph Rohrbach were key men for the Western Region convention

NAED—Keys to Distribution

Three keys to an electrical distributor's profit are (1) selling, (2) operating and (3) management. This was proved to some 550 who attended the Western Region convention of the National Association of Electrical Distributors at Hotel Miramar, Santa Barbara, Sept. 20-23, by Vice-president Ralph W. Rohrbach, Pacific Wholesale Electric Co., San Diego, with an exceptionally well coordinated program. It had been arranged by the man later unanimously elected to succeed him as vice-president of the region, Ken P. Rehwaldt, General Electric Supply, Los Angeles. Each of the three general meetings used one of the keys to open the doorway to the future of a profitable business.

A horrible example sometimes teaches a lesson in reverse. Such was, "There is no future if we sell like this," a clever skit enacted by Ken Rehwaldt and Ed Ross (repeated by popular demand after its previous showings at area meetings). In it the sloppy salesman was played with great realism by Rehwaldt; the contractor eager to buy, but frustrated at every attempt to do so, by Ed Ross.

From such a laughable launching pad the "selling" key of the program took off under E. C. Phillips, Coast Electric Co., San Diego, as chairman. A color movie, *Solid Gold Hours*, available for sales training from NAED'S William Jewell, regional manager, put it in orbit.

"Will there be a future market for electrical distributors?" was a thought-provoking subject explored by R. S. Edwards, president, Edwards Co. His answer was "Yes. But will present distributors be the ones to sell it?" In reviewing the record he showed that in 1908, 90% of all electrical products was sold through "jobbers," as distributors called themselves then. Nowadays only 21% is marketed through them. About 30% goes through specialty distribution outlets and 49% by other methods. In the hardware field, he said, comparable distributors have been able to hold 62% of the market and only 14% goes through specialty distribution and 24% through direct sales. He called attention especially to the new building supply dealers so numerous now, 85% of whom buy their electrical products through hardware distributors. More concentration—by manufacturers on selected efficient distributors, and by distributors on strong lines—was Edwards' remedy to sell a larger share and to broaden the market.

What the distributor will be selling in the future was predicted by Garlan Morse, vice-president, Sylvania Lighting Products, after probing outer space by contact with several industrial sales managers. "Your Catalog of the '60s," he said, would contain many pages of electronic products, computor components, thermoelectric devices and appliances, generators using solar and thermoelectric principles, transistorized controls and tape and computor control equipment, equipment for mobile and marine homes, ultrasonic appliances, electroluminescent lighting. He urged that distributors fit themselves and their people by training to handle such products and lines lest they go into electronic specialist distributors' channels.

Testimonials from distributors who have altered their selling and business methods and made them more profitable were told amusingly by Jake P. Hamblen, past president of NAED, from Houston.

George W. Provost Jr., NAED president, in the second key session on operating, turned the key toward the distributors' need for profit enough to provide for future growth. A farmer, he said, saves seed corn from his crops so that he will have the means to plant a future crop and keep in business.

Maage LaCounte, Columbia Electric, Spokane, who chairmanned the meeting, turned to people as the backbone of operating successfully and introduced Dr. E. M. Gherman, management counselor and psychiatrist, now president of Incandescent Supply Co. of Los Angeles. Dr. Gherman wittily described the very fundamental of business operation to be communication of plans, policies and observations between employees and management. To illustrate devastatingly how poorly most people see and hear and then how inadequately they communicate what they see and hear to others, Dr. Gherman experimented with six "volunteers" and the audience. The results were so drastic that he for one made excellent communication of his idea—that people must be trained to listen and to look with understanding, as well as to tell and conclude from such absorptions.

When Kinsey Robinson, president of Washington Water Power Co., fol-

R. C. Harper
Sylvania

R. H. Jones
G-E Supply

O. R. Doerr
PG and E

Garlan Morse
Sylvania

R. S. Edwards
Edwards Co.

J. P. Hamblen
So. Elec. Supply

lowed to tell from surveys how little the public and even employees understand about the business they are in or the enterprise system, his audience understood. Management does not clearly define job objectives or appeal to employees to give their jobs maximum output, or inspire them to defend the American system which makes their jobs possible.

If employees could have seen the computers take over their functions that Roy Jordan, General Electric Computer Department, illustrated with slides and movies, perhaps they might fear more for their jobs. The uncanny automation of accounting and inventory control was even accompanied by mechanized delivery of the talk as Jordan relayed what twin teleprompters rolled out before him, unseen to the audience.

Managing—third key to the future, with Vern Cooper, General Electric Supply, San Francisco, as chairman, made the logical summarizing session most vital. Arthur Hooper, NAED executive director, turned the key to unlock this over-all function.

In management for future profit, management must, said Hooper, apply creative thinking to analyze before taking a course of action; apply all available tools to communicate with each other and the industry (such as association meetings); learn to ask "why?" to get all the facts out on the table; and be consistent in policy and actions.

Measure of future business potential was taken by O. R. Doerr, sales vice-president, Pacific Gas and Electric Co., who warned that everyone in the industry must respond to the technological and sociological revolution going on, requiring new dimensions of management. Doerr recited a horizon of significant growth figures for the West and for the electrical industry, all challenging management to train itself and its people to meet the demands the future will make upon them.

Getting into managements' tools and methods, R. C. Harper, Western vice-president, Sylvania Electric Products, Millsdale, set forth three areas of management planning—(1) performance objectives; (2) policies and (3) detailed programs and plans. While objectives and policies appear to be the same, he said, policies are the road map to lead to objectives. He stressed particularly the need to set up communication of objectives and policies to all personnel to raise their sights and direct their energies into productive channels. Thus the whole organization functions as a team, whether the company be large or small.

That management must have moral character that will be respected by customers, suppliers, employees, owners and the general public and its representatives in government was the fitting concluding message ending the convention meetings. It was inspiringly given by R. H. Jones, young general manager of General Electric Supply Co., Bridgeport.

This thought was re-emphasized in the final luncheon address of Dr. William H. Alexander, First Christian Church, Oklahoma City. In an inspiring as well as good humored address he urged fighting valiantly and cheerfully for principles and truth in business as well as life. John Lawton, Graybar, Seattle, presided at this joint luncheon for the men and their wives, totaling about 700.

Election of officers for the new year brought Ken Rehwaldt, who had been elected area chairman for southern California, to the region's vice-presidency. Board of governors members elected were E. C. Phillips of San Diego, Earl Morton, Westinghouse Electric Supply, San Francisco, and John P. Lawton, Seattle. Area chairmen elected included Vern Cooper, San Francisco; Milton Hooper, Butte; Wes Carlson, Northwest.

Despite the complications of housing such a large attendance the entire convention, of which S. W. Messick, Los Angeles Wholesale Electric, served as general chairman, arrangements were efficiently handled. The program was arranged by Rehwaldt. R. M. Cooley, California Wholesale Electric Co., Los Angeles, had charge of entertainment and William M. Jewell, Western Region manager, coordinated the entire affair. The gala Hawaiian Night manufacturers' cocktail party at the Biltmore, a most colorful and exotic affair, was engineered by A. H. Gudie, R. McMillen, Al Rockwell and Ed Lewis.

If arrangements can be made next year's convention will be held immediately prior to or after the NECA national convention in Las Vegas, otherwise in San Francisco, it was announced.

Maage LaCounte
Columbia Electric

Dr. E. M. Gherman
Incandescent Supply

What's new in plant expansion?

Steadily rising costs are causing many electric utilities to take a searching look at traditional methods of handling plant expansion.

An increasing number of companies are finding that the total-responsibility contract, which has long been standard practice in the petroleum and chemical industries, offers important advantages to a utility.

When a single integrated firm is given full responsibility for design, engineering and construction and undertakes to deliver a plant that meets definite performance guarantees, then the contractor is also in a position to guarantee completion date and total cost—*and should be willing to do so.* With these two factors firmed up, financing problems are eased considerably. Risks are minimized, as the contractor assumes most of them. Lead time is shortened and continuity of the job is assured. The utility's own engineers, freed from a multitude of detailed responsibilities, can function on their proper level of operations management, broad supervision and long-range planning.

Furthermore, the integrated contractor, in control of all phases of the job and making a single profit, has a considerable advantage over a series of independent contractors handling separate phases. Through efficient management, procurement and scheduling he should be able to deliver more total plant value per dollar of investment.

It is Fluor's belief that the total-responsibility contract, with price and completion guarantees, is the best answer in many electric-utility situations, and Fluor is one of a very few engineering-construction firms serving the industry which encourage this type of contract. For detailed information on how the system works, write to Utility Sales Department, The Fluor Corporation, Ltd., 2500 South Atlantic Boulevard, Los Angeles 22, California.

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the most important investment
you can make is in the
creative ability of men.

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Engineers and Constructors

HOISTING THE DRUM—dramatic moment in the construction of every steam station. This one is being installed by Fluor at Cameo, Colorado, where Public Service Company of Colorado is adding a 44-mw. unit to its existing plant.

At the Power Use Workshop: (left to right) Gus Norwood, executive secretary of NWPPA, Vancouver, Wash.; Lacey Peoples, Cowlitz County PUD, vice-chairman for the 1960 meeting at Longview, Wash.; Ken Crow, Grant County PUD, chairman for the 1960 Power Use Workshop; C. W. Nash, British Columbia Power Commission, Victoria, B. C., chairman of the 1959 Workshop at Ephrata; S. R. Finley, general manager of the Chattanooga Electric Board, keynote speaker; and Ivan C. Laird, Coos-Curry Electric Cooperative, Coquille, Ore., president of NWPPA

NWPPA speakers urge group to

Serve All Energy Needs

Importance of building and retaining load in all classifications was stressed by speakers at the Northwest Public Power Assn.'s Power Use Workshop at Ephrata, Wash., in September. The three-day session was attended by 110 delegates representing 32 utilities.

Keynoting the workshop, General Manager States Finley of the Chattanooga Electric Power Board urged consumer-owned electric systems to seek and be responsible for all energy needs of the home. His organization has a complete appliance repair service; keeps the office open all day Saturday; provides a large brilliantly lighted sign for each all-electric subdivision; uses all available power use promotions aimed at serving the consumer.

200-amp Entrance

Questioning the value of wiring subsidies for range and water heater promotions that only add to the dilemma of inadequate wiring, Joseph L. Dressel, Klickitat County PUD, Goldendale, Wash., counseled helping the customer increase his housepower with a complete and adequate service entrance.

He quoted an earlier suggestion by Gus Norwood, NWPPA executive secretary, that utilities furnish the complete 200-amp service entrance including the entrance box with enough breakers to leave one spare for both a 120- and a 240-v additional expansion. The utility would not pay for this heavy-duty equipment at the retail price, he pointed out, but would, in fact, obtain the better wholesale price that goes with quantity purchasing.

Dressel believes that utilities could go a step further and advance the complete installation costs of heat pumps and other equipment. Repayment with interest could be set up in a special rate structure, he explained.

Klickitat County is presently maintaining a continuous record of kwh use by customers taking advantage of its own 200-amp panel promotion, run in 1958 and again from June to December 1959. (The panel is issued to the customer or his electrician, provided certain requirements are met, with the addition of specified appliances.)

The 202 panels with subfeed breakers already installed cost the district a little over $10,000, or 1.3% of annual revenue, Dressel said, and were charged to promotional expense. Resulting revenue increase amounts to more than $28,000 annually, he reported.

Off-Peak Power

Taking a look at off-peak power, Alan H. Jones, City of McMinnville, Ore., explored the possibility of promoting its use with special rates; considered types of load desirable and how they might be secured.

While businesses and industries operating at night or performing some major separate function during off-peak hours are desirable, smaller utilities might turn to off-peak residential loads, such as swimming pool or house heating, he suggested.

Much of the basic research, engineering, promotion and intelligent selling needed to market such off-peak load devices probably would be done by the manufacturers if they were aware of the possibility of an off-peak rate, Jones believes. As a positive step, he suggested a poll of NWPPA members as to whether or not they have or would consider an offpeak rate, and what types of load would qualify. Results of such a survey could be summarized and made available to manufacturers, he said.

What lies ahead for off-peak depends mainly on how well utilities carry out their program to step up power use, Clifford Burnip, B. C. Power Commission, Nanaimo, declared in pointing to the huge market potential, with its desirable load characteristics.

Touching on the storage-type electric furnaces and the electric car, he went on to suggest promotion of irrigation, incubators, brooders, swimming pool heating, block heaters for cars, oil furnaces for those definitely not interested in electric house heating, and lighting, which he termed one of the best bets in selling off-peak service. He emphasized all-night lighting as an off-peak potential load.

Pointing out that there is no magic formula for selling this type of service, he declared that, within the utility organization, management must first of all define responsibility for sales. When the organization and sales program are in place,

NO SUPPLEMENTARY LIGHTING—Here inside the new wing of Assembly Products, Inc., the Power Groove general lighting does all the work—without supplementary lighting—improving appearance and efficiency, reducing initial cost and operating expense.

"Our new building cost us 50¢ a square foot less—just by using new General Electric Power Groove Lamps!"

says Mr. John D. Saint-Amour, President, Assembly Products, Inc., Chesterland, Ohio

When Assembly Products, Inc., an aggressive and growing manufacturer of meter-relays, added a new wing to its plant in Chesterland, Ohio, it quickly settled on new General Electric Power Groove Lamps. Why Power Grooves? Because they got more light per lamp—so they needed fewer lamps and fixtures. They got a comfortable 250-footcandles on the work, *and saved 50¢ a square foot over the next most powerful fluorescent lamp type.*

In a recent letter to General Electric, Mr. John D. Saint-Amour, president of Assembly Products, said: "The Power Groove system recently installed in the new wing of our plant has already proved to be a valuable investment. In the older plant area, both general lighting and supplementary lighting were required. The general lighting *alone* is all that's needed in our new wing. We're confident this new lighting system will result in better, faster, and more efficient production."

PLANNING NEW LIGHTING? Then find out all about the *new* G-E Power Groove Lamps. They come in 4, 6 and 8-foot lengths—designed to deliver up to 15,000 lumens, and they're interchangeable with original Power Grooves. For more information, write: General Electric Co., Large Lamp Dept. C-938, Nela Park, Cleveland 12, Ohio.

SAVINGS ON INITIAL INVESTMENT BY USING G-E POWER GROOVES COMPARED TO OTHER 8-FOOT FLUORESCENTS

(Based on a 250-footcandle level, at about $2.06 per square foot using Power Grooves)	SAVINGS PER FOOT	SAVINGS PER 10,000 FT.
POWER GROOVES vs. 8′ HIGH OUTPUT LAMPS (at $2.56/sq.ft.)	50¢	$5,000
POWER GROOVES vs. 8′ SLIMLINE LAMPS (at $2.83/sq.ft.)	77¢	$7,700

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GENERAL ELECTRIC

For phone number of closest representative see advertising index in back of book.

customer surveys should be initiated, building permit lists obtained from City Halls and a program of regular customer contacts established, he said.

Swimming Pools

Growing interest in electric heating for swimming pools was pointed up in two talks. Howard James of Salem Electric pointed out that despite this popular interest the number of pools that go electric depends on the amount of work the industry does. Right now, gas and oil are in the driver's seat, he said. He made available a four-month record of water temperature, meter readings and kwh consumption for one Salem pool.

A. F. Turner, area development manager for Seattle City Light, said that the swimming pool heat load is very complementary to the winter heat load in an area that has a relatively low summer peak. Transformer capacity on the line for winter loads will be adequate, he said. The average pool heater is not of sufficient size to cause any voltage variation and heat dissipation characteristics are such as to provide a diversity sufficient to prevent feeder overloads, he stated.

Seattle Building Department permit figures for the metropolitan area show that 188 pools were installed during the first eight months of 1959, with total value of $1,196,722.

Heat Pumps

Dr. Roland E. Pillat, Northwest district representative for Typhoon Air Conditioning & Heat Pump Co., discussed water and air source heat pumps, with particular attention to applications in the Pacific Northwest. Application of heat pumps requires a thorough understanding of the economics of the installation, he said. His paper gave tables and other data on economics and selection, operating costs, temperature figures, residential load calculation, heating design, etc.

Operating Costs

Operating costs as a deterrent to the sale and use of electrical appliances, equipment and kwh were discussed by Sydney N. Coates, president of Coates Electric Mfg. Co. of Seattle. Equipment unsuited for the job; lack of customer understanding on its use; inadequate capacity, inferior wiring or faulty installations were listed as reasons for high operating costs. Areas in which serving companies need to do extensive research, he believes, are on: (1) rate structure based on what the traffic will bear instead of on well considered scientific formula; (2) restrictive demand charges; (3) restrictive control circuit requirements.

If recognized methods of selling and marketing of merchandise were employed, the rate schedule could be resolved on a single sheet of 8½x11 paper, he said.

Coates advocated making rate reductions if only for certain periods of the year on large capacity hot water storage tanks from 500 to 6,000 gal, swimming pool heaters, home heating units and similar devices. "Why penalize the best paying load available to the utility?"

Customer Services

Ways to increase utility revenue and lower power costs through special customer services were brought out by E. Z. Fredricks, Tacoma Department of Public Utilities. Pointing out that it is necessary to make a concerted effort to increase the annual kwh sales per customer in all classes of service, he recommended that utilities keep selling: (1) all the new business economically feasible for the customer to use, while retaining existing business in face of increasing competition; (2) additional services and replacement of competitive services; (3) the idea of more complete electric service to architects, engineers, designers and builders; (4) the idea that the utility is the natural place to look to in matters involving utility services.

Public Relations

Human relations were discussed by Lacey M. Peoples, Cowlitz County PUD, and Joe DeLeon, Seattle City Light, the former dealing with employee, the latter with customer information.

If you're not using radio to tell your story, you are working too hard, was the contention of W. A. Cook, Coos-Curry Electric Co. He pointed out that the relation between utility and radio station can be a mutual benefit compact, requiring very little money and only moderate amounts of time and imagination.

Montana REA Assn.'s Youth Electric Fair with scholarships and cash prizes for constructed items was highly praised by Clarence Rupp of Yellowstone Valley Electric Cooperative.

Workshop chairman Charles W. Nash of the British Columbia Power Commission was succeeded by Ken Crow of Grant County PUD. The 1960 workshop will be held at Longview, Wash.

Accountants Measure Performance

Performance measurement as a key to effective management was the theme of the 12th annual Accounting and Finance Workshop of the Northwest Public Power Assn., Sept. 30 and Oct. 1 at Vancouver, Wash. More than 110 from 48 utilities attended to take part in the practical discussions.

Chairman Ronald Miller, chief accountant of Lewis County PUD, organized the program.

Keynote speaker Phillip Mayer of BPA described a work performance measurement program used by BPA for planning, budgeting and controlling maintenance on its transmission and substation system. Ray Foley followed with a talk on responsibility reporting.

Gus Norwood discussed the evolution of ideas in the literature of management and urged accountants to do some reading regularly in the field of new management ideas.

Milt Bona and Joe DeLeon conducted a live-wire discussion on public relations while Gordon Tatum and Wally Young moderated the session on personnel administration. Leo Hansen conducted the REA Accounting session, which featured a talk by George Hogeweide on employee appraisals.

Fred Lieberg described the whole dollar billing procedure, C. R. Martinek handled the subject of credit losses, Maury Kay discussed inventories.

George Watters of Clark County PUD handled the arrangements, which included ladies tours, registration, the social hour and dinner dance at the Royal Oaks Country Club.

The group elected R. F. "Shep" Schaefer, chief accountant and treasurer of Snohomish County PUD, as new chairman, and Ray Perry, assistant manager of Klickitat County PUD, as vice-chairman.

Next year's Accounting and Finance Workshop will be at the Columbia Hotel, Wenatchee, Wash., Sept. 14-15, with Fred Scaife as arrangements chairman.

Prometheus, one of the earliest characters in classical mythology, gave the gift of fire to mortals and was punished for this infringement on the gods. He was bound to a rock to be devoured by an eagle and by the elements. But Prometheus persevered over all. His name still symbolizes enormous endurance over incredible hardship.

ENDURANCE BREEDS CONFIDENCE

Symbols that clearly show unusual endurance over the elements are uncommon. The mythological Prometheus represents strong day-after-day endurance. There's another such symbol, too . . . but not fictional. Kerite Cable, year in, year out, successfully resists the damaging effects of time and the elements. Whether exposed to the humid heat of the tropics, or the rigors of the cold damp Arctic, Kerite, wherever it is used, can be relied on for outstanding performance. That's why there is little cause for surprise when Kerite Cable laid in unusually difficult installations 40 or more years ago is found still to be in perfect operating condition today. Kerite's acceptance is greatest with those who have used it longest. Endurance, over the years, breeds confidence.

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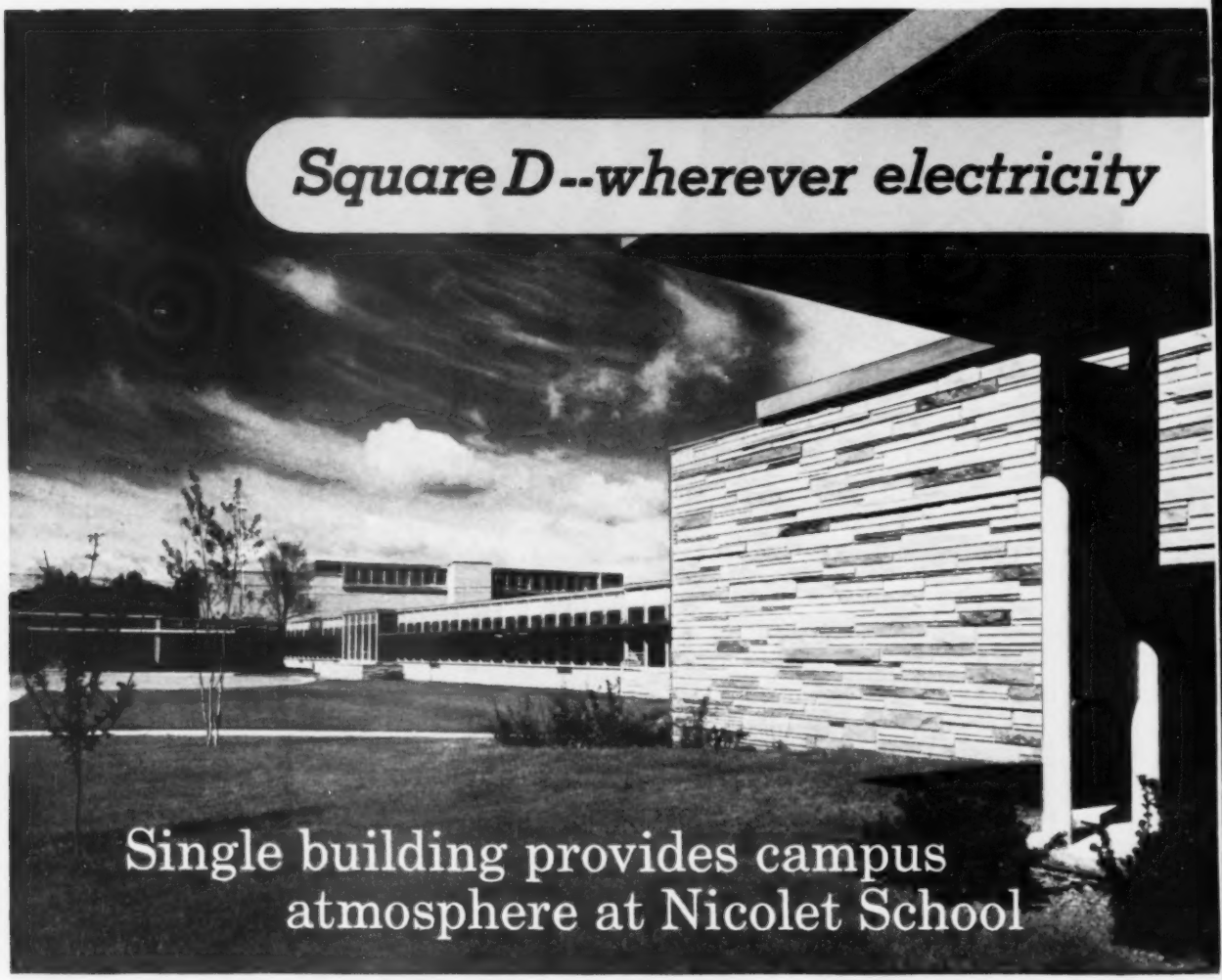

NICOLET HIGH SCHOOL in suburban Milwaukee is "environment-controlled," achieving the open vistas of a campus with a single-unit building. Various school functions are located along the legs of an irregular "H"—an arrangement having no enclosed courts to interfere with the light, air and natural beauty of the 48-acre site. Horizontal aluminum sun shades and colored plastic louvres eliminate inside shades and venetian blinds—leave classroom views unobstructed.

School activities are grouped by related types, with athletic and shop facilities well removed from teaching areas. Isolation from highways and roads provides the environmental safety of a park. Community use is extensive. Swimming and many other recreational activities make Nicolet an important community center. *Square D electrical equipment is on duty throughout this impressive school plant...further evidence that you'll see the familiar* D *wherever electricity is distributed and controlled.*

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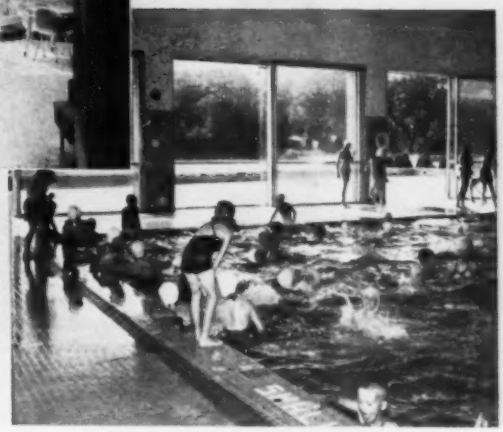
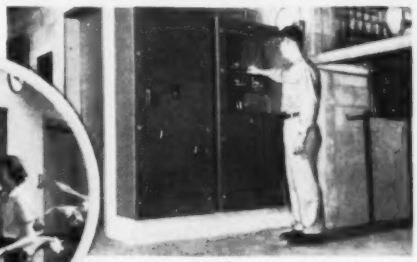
is distributed and controlled

There are no study halls in Nicolet • **Instead, the Student Center (*left*) Library, Cafeteria and various classrooms are well located and equipped for study-hall purposes. With its adjoining outdoor terrace, the Student Center provides a quiet, relaxing atmosphere in keeping with the concept of a campus.**

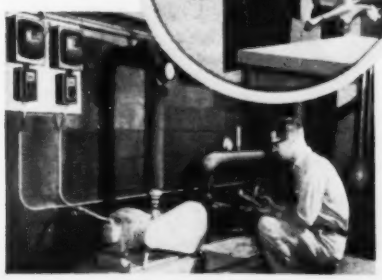


Indoor-outdoor swimming pool **is on sunny side of building with adjacent sunbathing terrace. Window wall has double sliding glass doors with heated space between, adapts the pool to both summer and winter use.**



Typical Square D lighting panelboard of which there are many throughout the building

One section of the main electrical distribution system utilizing Square D QMB panelboards



Square D switches and starters are used in the control of the various operating functions throughout the building

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ADJUSTABLE SPEED DRIVES
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HIGH VOLTAGE CONTROL
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LIFTING MAGNETS
LIGHTING AND POWER PANELBOARDS
LIGHTING CONTROL—LOW VOLTAGE
LIMIT AND FOOT SWITCHES
MACHINE TOOL CONTROL
MAGNETIC BRAKES
METER MOUNTINGS
MOTOR STARTERS
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PUSHBUTTONS
RELAYS AND CONTACTORS
RESISTORS
SAFETY SWITCHES
SERVICE ENTRANCE EQUIPMENT
STAGE DIMMERBOARDS
STEEL MILL CONTROL
SWITCHGEAR & UNIT SUBSTATIONS
SYNCHRONOUS MOTOR CONTROL
TERMINAL BLOCKS
TEXTILE MACHINE CONTROL
TIMERS
VOLTAGE TESTERS
WELDER CONTROL

news

Upstream view—The Dalles Dam on the Columbia, with power house at right and earth-fill section curving to Oregon shore

The Dalles power house was dedicated officially on Oct. 10, when Vice President Richard Nixon pressed a button to set the tenth generating unit in motion. Nixon is shown here with Lt. Gen. Emerson C. Itschner, chief of engineers

Henry Allen, Allis-Chalmers sales rep at Seattle, is given a retirement party by office employees of Tacoma City Light. He started with A-C in 1918; has been in the Seattle district since 1923

Service to some 35,000 electric customers in Denver was interrupted during a five-day storm, which deposited more than 18 in. of snow. Here linemen raise a snow-burdened tree limb from power lines

An industry old-timer, 1895 vintage d-c generator producing 80 kw, was exhibited by Washington Water Power Co. at a Northwest area meeting of the American Power Dispatchers Assn. One of the first built by G-E, it was installed at Monroe Street station in 1895. From left: Rowland Schou, president of NW group; Phil Williams, PP&L; Douglas Philip, BCE; Ray Wetherell, WWP; Roger Kennedy, G-E; Lloyd Radford, Idaho Power; Grant Bull, PSP&L; Dale Kelly, PGE

EW

Management

Significant New Tie Line

Utah Power & Light Co. and Arizona Public Service Co. served notice to the West that they are ready, willing and able to handle bulk power distribution from the big Glen Canyon Dam on the Utah-Arizona border. Executives of the two companies announced they will construct a 230-kv intersystem tie line between Flagstaff, Ariz., and Salt Lake City, a distance of 455 miles. The cost of completing the interconnection will be just over $23 million.

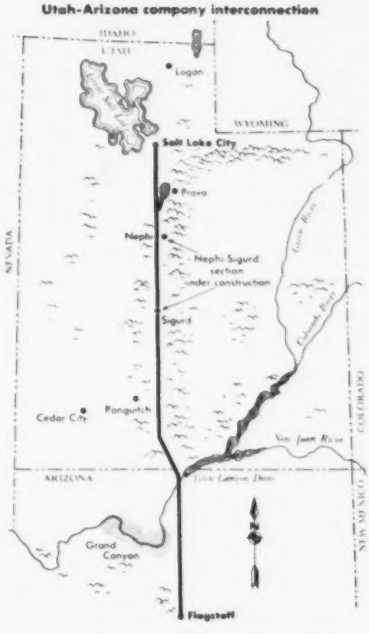
The new interconnection is of unusual interest for two reasons. First, its route will take it close to the site of the huge Glen Canyon dam site being built by the USBR and thus would be the logical way to distribute Glen Canyon energy to the north and south (see map). Second, there is a distinct operating advantage in the integration of the two systems as the peak in Utah occurs during the winter, while in Arizona the system peak occurs in the summer. Thus, the line takes advantage of geographic and climatic diversity.

Third, the line will provide the first really strong intertie between the Northwest Power Pool and the great electrical interconnections of the Pacific Southwest. Utah Power & Light is closely integrated with other Northwestern companies, while Arizona is tied in with California Electric Power and Hoover Dam partially over USBR transmission circuits.

REA Viewpoint

D. W. Reeves, president of the Public Service Co. of New Mexico, recently told a meeting of the Northern Rio Arriba Electric Cooperative that the expansion of a cooperative at the expense of investor-owned companies costs every single taxpayer in the country and is a double burden to the townspeople served by the cooperatives. He pointed out that towns in New Mexico which receive REA power are paying more for their power than they would if they were served by free enterprise companies and that these towns were actually subsidizing the surrounding rural areas.

Utah-Arizona company interconnection



He spoke frankly about the tax subsidy enjoyed by publicly owned utilities, pointing out that REA expansion into suburban, commercial and industrial business cuts into tax revenues and increases the tax burden on everyone.

In another area the principle of REA expansion was also under debate. The award of a power contract for Yellowstone National Park to the Montana Power Co. was under congressional investigation. California's Democratic representative, John Moss, is spearheading an investigation to see why the power contract was not awarded to one of two Intermountain REA cooperatives. Park officials defended their position by stating that the logical channel for additional power was from the north where transmission lines would least mar the beauty of the area.

NEWS INDEX

Associations	116
Communication	106
Growth	102
Manufacturers—Distributors	108
Management	101
Market Development	105
People	109

Mountain Sheep Progress

Exporatory drilling to obtain data for the Federal Power Commission hearings on the Pacific Northwest Power Co.'s application to build the 690-ft-high Mountain Sheep Dam on the Snake River (above the mouth of the Salmon River) is now in progress. PNP has filed a revised license license application with the Federal Power Commission for construction of the dam. This action was taken after FPC had turned down the application for the construction of a low Mountain Sheep Dam and a Pleasant Valley Dam in the same area.

The 2,000,000-kw project, costing $178 million, would be the largest hydroelectric project ever undertaken by investor-owned companies. Opposition to the project is expected from public power groups and from conservationists who fear that the high dam would be harmful to migratory salmon (see below).

Costly Fish

The fish ladders and other equipment necessary to protect salmon runs in the Northwest are estimated to cost a total of $136 million for all of the dams completed, under way or authorized for construction by the Corps of Engineers in the Columbia Basin. This is over half again the entire original cost of Bonneville Dam, according to the Walla Walla District office of the C of E.

Army Engineers have just completed steep ladder tests preparatory to designing the fish ladder for the 100-ft-head Ice Harbor Dam on the Snake River. At the latter plant, the fishway will go up one foot for every 10 ft in length as compared with the normal ratio of one foot for every 16 ft of length. Tests showed

that fish were not fatigued in climbing the steeper ladder which will be shorter and save about a half-million dollars in construction costs.

Chelan PUD Expansion

Chelan County Public Utility District is expanding its Wenatchee headquarters by adding an additional story to the present building. In the new area a power dispatching center as well as other offices will be constructed.

The PUD serves approximately 16,000 customers. A recent engineering report on the 11-year operation of the utility shows that, since 1948, sales have increased 235%, revenues have increased 103% and the customers served increased 34%.

► The Idaho Supreme Court ruled unconstitutional a law that would have permitted the use of state funds to reimburse utility firms for the cost of relocation of lines as a result of new highway construction. The ruling stated: "The right of utilities to the use of public thoroughfares is not and cannot be regarded as a permanent property right."

► The San Francisco Housing Authority refused a request from General Electric to change or withdraw its low bid for 1,258 gas and electric meters. The G-E bid was $1,032.61 less than three other bidders, all of whom bid identically at $22,266.60. The G-E request was based on an error in calculations but the customer apparently is adamant.

► Sulphur Springs Valley Electric Cooperative of Willcox, Ariz., was granted a $2,410,000 loan to finance 231 miles of distribution line, 14 miles of 69-kv transmission line and a 6,000-kva substation. . . The Big Bend Electric Cooperative of Ritzville, Wash., also received a $1,225,000 loan to build 151 miles of distribution line.

► Kellogg, Idaho, will get the Bunker Hill Co.'s new $10 million fertilizer plant. Kennewick, Wash., had also been considered but Kellogg was finally selected primarily because of the availability of sulphuric acid (a major ingredient in fertilizer) which is available from the Bunker Hill electrolytic zinc plant operation at Kellogg.

James R. Kearney Jr., president of James R. Kearney Corp., died in St. Louis Oct. 16, following a heart attack. His son James R. Kearney III was in San Francisco on business when word was received.

"Hey, Bob!" When you yell for "Bob" at Priest Rapids Dam you get high-level action. These four top officials are (left to right) Bob Davidson, resident engineer for English Electric Co., supplier of generating equipment for the dam; Bob Jackson, resident engineer for Harza Engineering Co. of Chicago, designing and supervising engineering firm for the project; Bob Ries, supervisor of production for the Grant County PUD project; and Bob Jenks, project manager for Merritt-Chapman & Scott, the contractor

Growth

The Dalles Dam Dedicated

As Vice President Richard Nixon pressed the button, generating unit No. 10 at The Dalles power house went on the line and The Dalles Dam was officially dedicated. The Dalles project, which was authorized by the 1950 River and Harbor Act, was officially started in February 1952. The power output of the dam will grow until 14 units, totaling 1,119,000 kw, are in place. Ultimately when there is sufficient storage upstream a total of 22 generators will be in place, raising the total output to 1,743,000 kw.

Additions to the main units rate at 78,000 kw, auxiliary unit for the fish collection system rate at 13,500 kw and the station's service units are rated at 3,000 kw.

The dam, with 14 units, has approximately twice the output of Bonneville Dam (528,000 kw) but is only half the size of Grand Coulee with 1,944,000 kw.

The Dalles Dam project was designed and construction supervised by U. S. Army Corps of Engineers. Total cost of the dam is approximately $250 million.

Transmission Plans Bared

Setting down his company's plans for future high-voltage transmission lines in central and southern Wyoming, Veryl Hoover, Wyoming general manager for PP&L, made the following statements to E. O. Larson, USBR regional director at Salt Lake City:

"We are now planning for and working on a 230,000-v circuit from the vicinity of Pilot Butte through Riverton and Lander to a point near Atlantic City, Fremont County, Wyo. It is our intention to extend this 230,000-v line from Alantic City to the vicinity of Rock Springs before the middle of 1963.

"Initially, it is expected that these lines will be operated at 115,000 v but will be so constructed and insulated that the voltage may be raised to 230,000 whenever necessary. Our intention is to build enough capacity into these lines to take care of all the present and foreseeable requirements for electric service in this area.

"In order to thoroughly integrate the company's system with those of the bureau and neighboring utilities, we plan to construct at least one 230,000-v circuit from Casper to Rawlins to Rock Springs and west-

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NEW

Bulletin 700, Type B-220A, AC Control Relay with 2 N.O. and 2 N.C. contacts.

NEW

Bulletin 700, Type BX-440A, AC Control Relay can be wired for normally open or normally closed contacts.

NEW ALLEN-BRADLEY BULLETIN 700 RELAYS

Improved features set new performance standards

For years, Allen-Bradley Bulletin 700 Type B and Type BX relays have been preferred for their long life and trouble free operation. The improvements in the new Bulletin 700 Type B and Type BX relays will set new performance standards wherever they are used. Naturally they use the famous A-B double break, silver alloy contacts which always remain in perfect operating condition without cleaning or filing. The cast coil cannot be damaged by the severest atmospheric conditions.

These new Allen-Bradley Bulletin 700 Type B and Type BX relays offer even greater value and greater reliability than ever before—but the price has not been changed.

- **New mechanical design gives at least 5 times greater operating life.**
- **New contact motion provides 10 times greater electrical reliability.**
- **Complete interchangeability—mounting dimensions are unchanged.**
- **New hermetically sealed plastic coil fits Bulletin 700 relays presently in use.**
- **New, stronger, movable contact crossbar—also fits old relays.**
- **New reinforced stationary contact blocks—interchangeable with previous design.**

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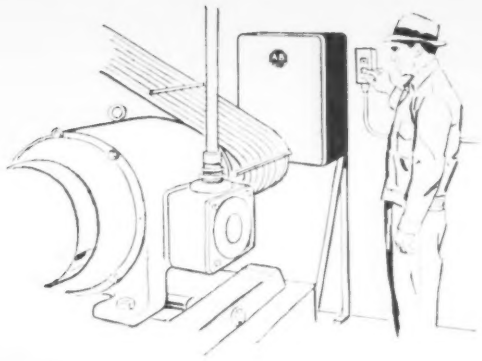
Quality Motor Control

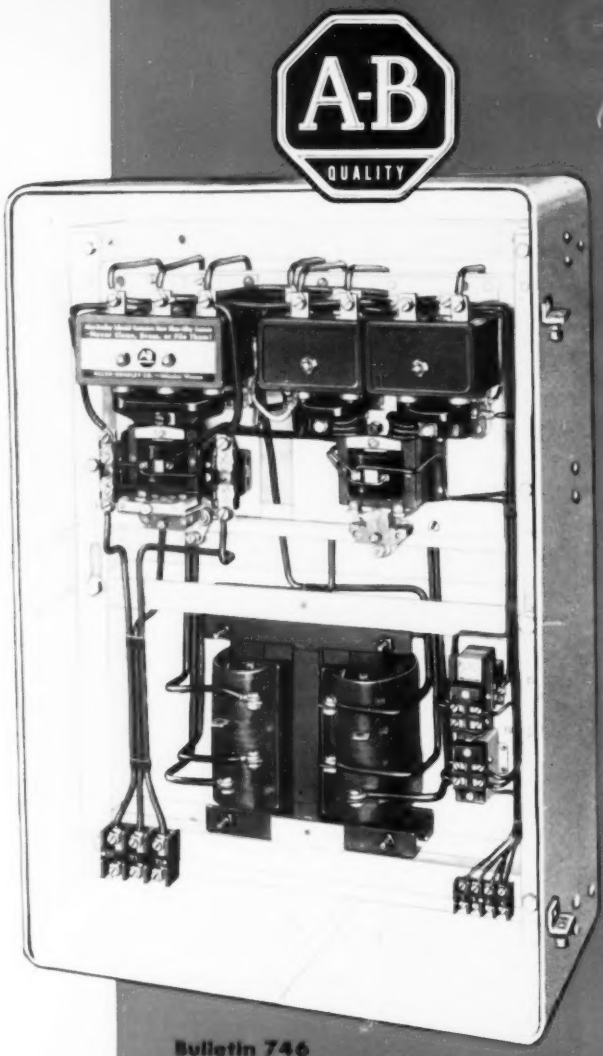


WHEN REDUCED VOLTAGE STARTING IS A MUST

Only Allen-Bradley can provide all the answers

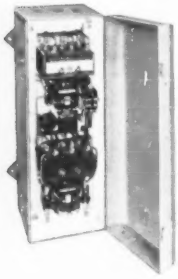
The Allen-Bradley line of reduced voltage starters makes possible a selection of the best starter, not only to meet the power company's requirements but also to provide the best starting conditions for the motor and the "load" that it drives.

The simple solenoid contactors in A-B reduced voltage starters have only ONE moving part—assuring millions of trouble free operations. And their double break, silver alloy contacts never need costly maintenance. Accurate, reliable overload relays protect motors against burnouts. Write for Publication 6088.



Bulletin 746

Automatic reduced voltage starter for squirrel cage motors that should not be started on full line voltage. It employs autotransformer connected in open delta to reduce line voltage during starting. Adjustable timing relay controls starting period. Taps are provided on the autotransformer to adjust the starting voltage applied to the motor. Ratings to 300 hp, 220 v; 600 hp, 440-550 v.

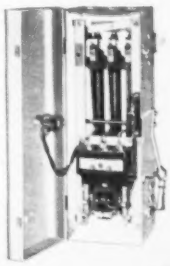


Bulletin 740

Graphite disc resistors are automatically inserted in series with the squirrel cage motor at starting, and they are automatically cut out after a predetermined time. Turning a single screw on the starter frame adjusts the compression resistors exactly to motor and load conditions for velvet smooth acceleration. Ratings to 200 hp, 220-440-550 v.

Bulletin 640

Where remote control is not needed, these graphite compression disc resistor starters provide stepless acceleration of squirrel cage motors. Operated by hand lever, the smooth starting of the motor is under the control of the operator. No-voltage and dependable overload protection is provided. Ratings to 200 hp, 220-440-550 v.



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ward to interconnect with the systems of Utah Power & Light Co. and Idaho Power Co. It is our opinion that the construction of this line will be justified prior to the end of 1965."

Also of interest to the state and the Rock Springs area was the proposal of Southern Wyoming Utilities Co. of Rock Springs to construct a high-voltage transmission line from Rock Springs to Flaming Gorge. This proposal was outlined in a letter from Southern Wyoming Utilities directed to the USBR.

The letter stated that the company is willing and able to construct a line of sufficient capacity to transmit all of the power which might be destined for delivery in this area. The line would be constructed for transmission at 230,000 v, but would be operated initially at 115,000 v.

K. E. Darling, general manager for the Southern Wyoming Utilities, stated that construction would be dependent upon receiving an allocation of Colorado River power of sufficient size to take care of estimated future requirements.

File for Trask Project

The Tillamook County PUD has filed applications with the Oregon Hydroelectric Commission and the Oregon Water Resources Board for preliminary permits for construction of hydroelectric projects on the Trask and Nehalem Rivers, both coastal streams.

The proposed Trask project would produce about 20,000 kw at two dams. Cost estimates range from $5,250,000 to $12,250,000, depending on site selection and dam height.

Financing for the proposed dams would require approval of a revenue bond issue by Tillamook County voters.

Co-op Drops Generating Plans

Largest expansion in the 22-year-old history of the Sulphur Springs Valley Electric Co-op is planned with a $2,410,000 REA loan. W. B. Loving, general manager, said $1,522,000 will be used for new member expansions, providing 1,250 new connections over the entire system and 231 miles of new distribution lines.

Another $350,000 will be used to increase substation power at Cochise from 30,000 kva to 50,000 kva and to build a 10-mile transmission line between St. David and Tombstone.

Two other substations will require $360,000. And $200,000 will be spent on warehouse expansion and equipment.

Originally, the co-op had planned a $9,852,000 loan request which would have included a steam generating plant. This was reduced because the co-op intends to purchase power from Glen Canyon Dam when it is completed.

BPA Summary

Energy sales of Bonneville Power Administration were up 1.2% and its revenue up 2.8% in fiscal year 1959 over fiscal 1958.

BPA tabulation of generation and sales statistics show energy sales of 28,696,500,000 kwh with revenue of $66,866,000 for average revenue per kwh of 2.33 mills.

Maximum demand from federal generating plants on the Columbia River system was down 5.7% to 4,737,000 kw.

Portland General Electric Co. was BPA's largest individual customer with energy deliveries of 2,789,794,000 kwh at a rate of 2.12 mills. Total use of BPA power by privately owned utilities decreased 1.6% from 1958. Bonneville's nine private utility customers used a total of 6,586,601,000 kwh at an average rate of 2.19 mills.

Publicly owned utilities increased their energy deliveries 5.1% for a total of 9,355,539,000 kwh at an average rate of 2.74 mills.

Market Development

Compact House Has Gold Medallion

The Compact House, a Gold Medallion home, was featured at the Los Angeles County Fair in Pomona through cooperation of Southern California Edison Co. and building and electrical firms throughout the area. The house was built by Don Hershey of Claremont for the Building Contractors' Assn.

Described by T. M. McDaniel Jr., Edison vice-president, as a "small house with big ideas," the home represents an attempt to meet the needs of an increasing number of people who do not want large, sprawling houses. It combines functional efficiency with numerous comfort-plus features.

Portables Division

Formation of a new Westinghouse portable appliance division with headquarters at Pittsburgh was announced by Chris J. Witting, vice-president in charge of consumer products. Vice-president Richard J. Sargent will head the new operation, which gives portables full division status. Formerly they were included with major appliances.

Witting also announced appointment of O. H. Yoxsimer as general manager of the television-radio division at Metuchen, N. J., succeeding E. J. Kelly.

► "Supermarket of Values," a promotion enabling dealers to offer appliances by the pound, has been introduced by Hotpoint. Under the new plan, a range can be purchased for, say, 69¢ a pound, a washer for 89¢. Dealers will set their own price according to varying marketing conditions. A national advertising campaign will back the promotion.

McGonigle Retires

D. J. McGonigle, the man responsible for Electro-Day, retired Sept. 30 as general sales manager of the Montana Power Co., after 43 years with the organization. He is succeeded by William W. Talbott, executive assistant to officers of the utility.

McGonigle

An exponent of new ideas in sales promotion, "Dee" McGonigle conceived the Electro-Day concept for unified industry promotion of electrical living on a specific day of each month. He began his career as an electric appliance salesman in 1919 and was advanced to general sales manager of Montana Power in 1939. In addition, he has found time for many civic and educational activities. Among them is service as a member of the Board of Regents of Gonzaga University in Spokane, from which he was graduated in 1916.

Talbott will continue his duties as executive assistant and will assist the company's officers in executive

and management functions. He is a native of Butte and a graduate of Montana State University. He went with the utility in 1931 and has been associated with sales and management in four divisions—Helena, Missoula, Lewistown and Bozeman.

Model Home Held Over

Public interest in the Mark 59 Gold Medallion Home, which was featured in the Los Angeles 1959 Home Show, prompted the Los Angeles Department of Water & Power to hold the all-electric model home for a longer run.

The model house has been moved over to the department's new Electric Living Center and is being displayed there along with exhibits of modern conveniences for living better electrically.

► **Lynn Anselmi** has been named home economist for Pacific Power & Light Co.'s Wyoming service area. She takes over the role of "Polly Pacific" held by Mrs. **Donna Beth Downer** for the past three years. A Wyoming native, Miss Anselmi received a degree in home economics from the University of Wyoming in 1955. Before joining PP&L, she taught vocational home economics.

Anselmi

► **James H. Waid** has been appointed sales promotion manager of the general sales division, Los Angeles Department of Water & Power—a new post created under the recent reorganization. With the department for 25 years, he was most recently manager of new construction sales, concerned with major electric appliances, adequate wiring and with negotiating customer agreements for residential line extensions and service installations. He is an engineering graduate of the University of Cincinnati.

► Thirty-two Amana dealers in southern California and Arizona won all-expense vacations in Hawaii, awarded by **Gough Industries** for second-quarter sales. The trips were for 10 or seven days, depending on points earned. According to Gough Vice-president S. T. Bell, sales for the period were 37.6% above the same quarter last year.

Brasure

Piper

► **Hal N. Brasure** has been appointed advertising and sales promotion manager of Sues, Young & Brown, Los Angeles. He will be working with **John Sues,** who remains vice-president of advertising and sales promotion. Brasure has been assistant sales manager in SYB's Zenith Division. He will be replaced in that post by **Don Piper,** who has been the district manager for Zenith in the metropolitan area. The company distributes Zenith radios and TV, Typhoon air conditioners and heat pumps, and KitchenAid automatic dishwashers in southern California.

Farm Power Conference

David A. Hamil, REA administrator, will be the keynote speaker at the Sixth Annual National Electric Farm Power Conference to be held at Phoenix Nov. 18-20. Afternoon section meetings will cover electric heating, appliance and equipment servicing and selling to get a greater return from the sales dollar. Farm Better Electrically to Live Better Electrically is the theme for the conference, sponsored by the Inter-Industry Farm Electric Utilization Council, Washington, D. C.

► An assembly of businessmen at the Oregon Centennial Exposition received a Pacific Power & Light Co. *Bulletin* extra, with details of the company's construction program. Included in the story, which PP&L officials thought well worth an Extra, were a roundup of what the utility is doing to serve growing power loads on its system and its extensive activities in behalf of area development.

► Hilo Electric Light Co. officials threw the switch on Oct. 7 to give the benefits of **electric living to residents of Kapoho village** in Puna. Only 27 miles from Hilo, the town is receiving electricity for the first time.

► Taylor Distributing Co., Billings, Mont., has opened a branch operation at 206 E. Augusta St., Spokane.

Communication

PROPOSED MICROWAVE is the subject of a discussion in Washington by EIA and representatives of many power utilities. The FCC's recently proposed stringent regulations for microwave users, particularly the frequency stability required could cause amortization of millions of dollars worth of esquipment prior to the normal time. It is expected that the meeting will result in formal comments to the FCC requesting more lenient requirements.

NCUR is taking issue with the FCC mobile radio frequency allocations which give the new split frequencies to Forestry Products in the states of Washington, Oregon, Arkansas, Louisiana, Texas and Oklahoma. Bell Systems and Common Carrier's petition for a rewiring on the recent order on Docket 11866 which opened the microwave spectrum for private use has been granted in part by the commission. This may lead to more extensive fact findings with consequent delays in implementing the policies which were set forth in the docket.

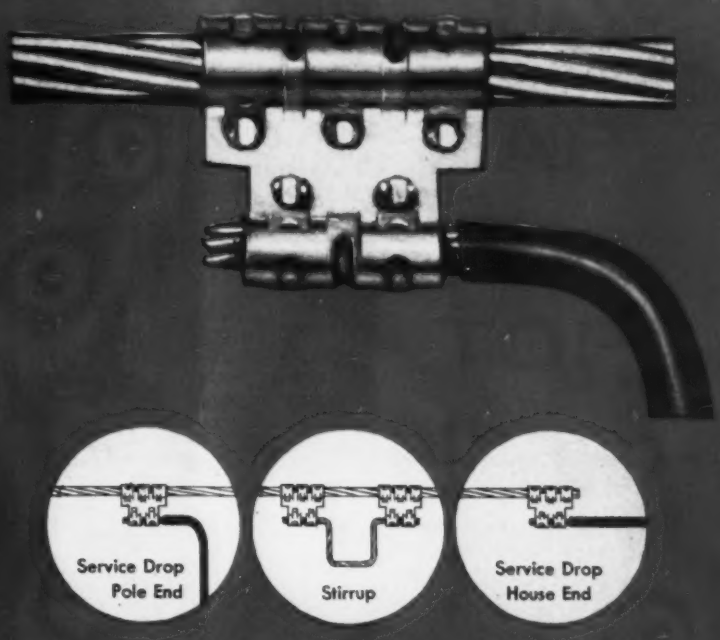
THE COPPER STRIKE so far has had small effect on electronic equipment suppliers; however, it is felt one or two more months may use up the reserves.

TRANSISTORIZATION is now universal by national manufacturers. Frequency and power problems will no longer be a limiting factor because of recent development in the transistors.

SOLID STATE now appears to be a possibility. Researchers have announced that free electronic emission from solid-state devices has been achieved. This means that a very small amount of power may be used to produce electronic emission from a solid-state cathode. Such a device would offer some of the advantages of high vacuum with a low power requirement characteristic of transistors.

AIEE COMMITTEE hopes to have a manual ready for publication next year which will outline ways and means of making power line carrier measurements. This will help the communications engineers immensely as these measurements are now as varied as the engineers who make them.

The TAP that TOPS them all...



THE MULTI-PURPOSE AMP UTILI-TAP for aluminum and/or copper conductors

Tired of all the expensive clutter in your stock rooms—a special tool for this, a special piece of hardware for that? Now you can clear out a lot of your inventory clutter with all new A-MP UTILI-TAP

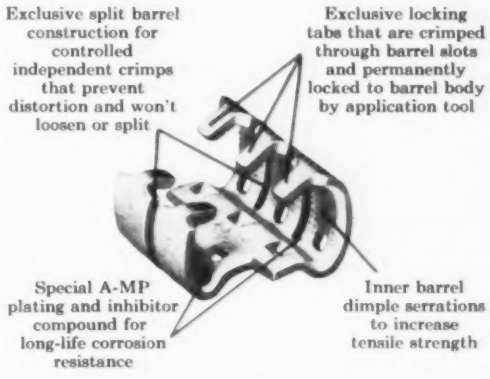
Here is a product that can be used on diverse tapping installations—like no other product on the market. It's permanent, it's sure and it will do many, many jobs.

Your stock can be simplified and easily maintained. Your linesmen can now go up the pole without pockets filled with miscellaneous parts or belts loaded with special tools. Simplify with the A-MP UTILI-TAP

Light-weight matched tooling available in mechanical or hydraulic types.

The only tap on the market that converts from an easily attached open barrel construction to a permanent, closed barrel attachment.

Look at these unbeatable features:


Exclusive split barrel construction for controlled independent crimps that prevent distortion and won't loosen or split
Exclusive locking tabs that are crimped through barrel slots and permanently locked to barrel body by application tool
Special A-MP plating and inhibitor compound for long-life corrosion resistance
Inner barrel dimple serrations to increase tensile strength

Full range of wire size combinations for aluminum, copper or ACSR conductors.

Send today for more information to solve your tap inventory and reliability problems simultaneously.

American Pamcor, Inc.

GENERAL OFFICES: 181 HILLCREST AVE., HAVERTOWN, PA.

Exclusive Distributor For AMP Products To The Utility Industry

For phone number of closest representative see advertising index in back of book.

Manufacturers—Distributors

Chance Expansion

A. B. Chance Co.'s Western regional headquarters, now at 815 Tennessee St., San Francisco, will be moved to the Millsdale industrial area, Burlingame, Calif., shortly after the first of the year. Dwight Argo, Western regional vice-president, says the new building will have twice the area and offer improved facilities for Chance's Western office, manufacturing and service center operations.

Porter Buys Hill Transformer

Purchase of Hill Transformer Co. of San Carlos, Calif., by the H. K. Porter Co. was announced last month. Porter acquired all stock and took over assets and liabilities, with price to be decided after a final accounting.

Operating as a wholly owned subsidiary, Hill will continue under its own name, with Max Hill as general manager. The Hill line will supplement Porter's Delta-Star Division.

► **W. Dan Sinclair** has joined Kaiser Engineers division of Henry J. Kaiser Company as a power consultant. His specific assignment will include development activities in the power field with particular emphasis upon utilities of medium size. He is particularly known in the industry for his achievements at Plant Crisp, the nation's first combined gas turbine-steam turbine generating facility.

Sinclair

► **John E. Gabrielson** is the Bristol Company's new sales engineer in Salt Lake City.

► **Jack McGee** has been promoted to assistant sales manager for the western United States by **Western Insulated Wire Co.**

► East of the Rockies: **Henry Lehne** was made a senior vice-president of **Sylvania Electric Products,** with responsibility for Sylvania Electronic Systems. . . . **Arthur G. Schuh** is now technical service manager for **William Brand & Co.** . . . **Bill Banning, Kelman** purchasing manager, assumed consultant status Oct. 1, and will retire on Dec. 31. **John Morgan** has succeeded him as purchasing manager.

► **Charles Herrin** has been made sales manager, two-way radio products, for **Motorola Communications & Electronics** in 10 Western states. With headquarters at 1616 Rollins Road, Burlingame, Calif., Motorola's Western area sales office, he will coordinate sale of two-way mobile and portable radio equipment in five sales regions. He has been with the company for six years and has been an account executive since April 1958.

Herrin

Anniversary Contests

Line Material is celebrating the "Silver anniversary year of round-wound transformers" with appliance and cash awards to utility personnel and a transformer "hunt" among utilities.

Utility people who started their careers during 1934, the year the company started making distribution transformers, are invited to complete participation cards available from ads, L-M field engineers or the home office. Two hundred whose cards are drawn will receive a Toastmaster appliance of their choice, with cash bonuses for all hired on the day L-M began transformer manufacture.

The oldest L-M transformer, operable with its original core and coil, is the object of the hunt for a unit to be placed in the company museum. The utility owning it will be offered for replacement a new conventional RWP or Pad-Mount transformer in rating of 50 kva or below, 15 kv or below. In addition the utility will receive $500 to be used at its discretion for an employee benefit program.

Deadline for both contests is Dec. 15.

► **Morrison-Pelsue** has moved to a new factory building at 2001 S. Bannock St., Denver 23, Colo. Floor space has been more than doubled, according to **Ray Morrison.**

► **S&C** has broken ground at Chicago for a $2 million laboratory for development and testing of high-voltage circuit interrupting devices. Initially the building will house a 60,000-kva short-circuit test generator and equipment for 60-cycle flashover testing. Later a surge generator and a 500,000-kva short-circuit test generator will be added. According to **John R. Conrad,** S&C president, the laboratory is believed to be the city's first large electrically heated industrial building. It will have resistance units for the test areas and heat pumps for office areas.

► **George Hamburger** has been made sales manager for **Copperweld's Wire and Cable Division,** with headquarters in Glassport, Pa., Vice-president F. E. Leib announced. A native of Denver, Hamburger received his technical education at the School of Engineering, University of Colorado. In the electrical field since 1934, he was most recently manager of communication and government sales for the division.

Hamburger

Leib also announced appointment of **R. C. Ridley,** assistant manager of sales at Glassport, as assistant to the vice-president.

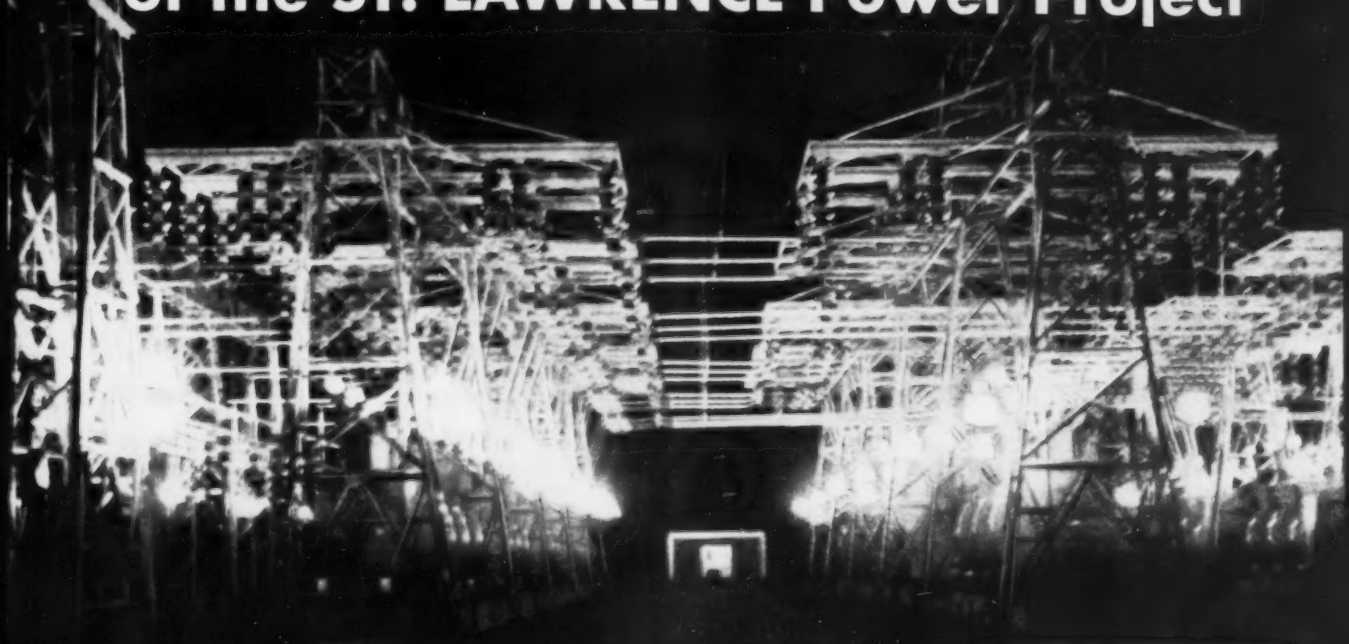
► **Harry E. Morgan** has been appointed executive vice-president of **Curtis-AllBrite Lighting** Inc., according to announcement by E. O. Anders, president. Anders says Morgan will assist him as chief executive officer.

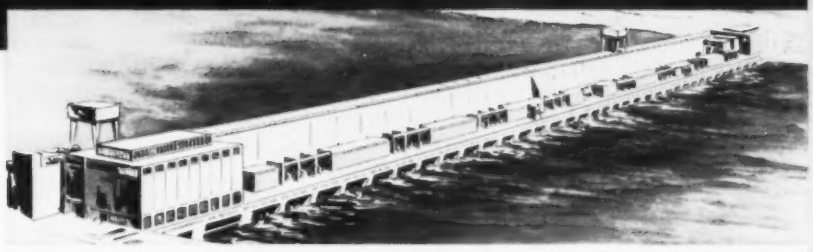
Specialist Appointed

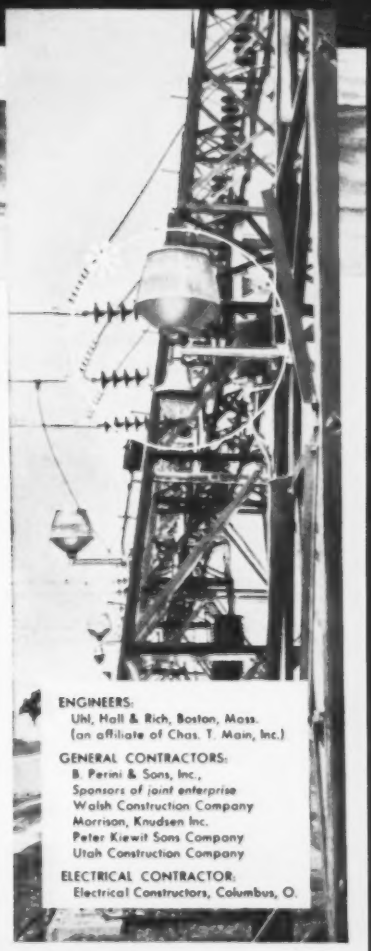
Frederick R. Gloeckner has been named to a new post with General Electric—West Coast engineering specialist and product coordinator for small a-c motors used in industrial materials handling. With headquarters in the company's San Jose, Calif., motor assembly plant, he will act as direct liaison for the company with its district engineers and customers.

According to W. V. Gough, marketing manager for the company's small a-c motor department, the post was created to help provide the working relationship between factory and sales force necessary to keep pace with the West's rapid industrial expansion.

HOLOPHANE Lights the Switchyard of the ST. LAWRENCE Power Project







New, Big Switchyard becomes
The World's Best-lighted Yard . . .
with Holophane Substation Luminaires*

One of the world's great hydroelectric developments, the St. Lawrence Power Project, was viewed by Queen Elizabeth and Vice-President Nixon on June 27, 1959 . . . Illumination of the 7-acre switchyard which takes power from the Robert Moses Plant was a tremendous problem in itself. It was solved by the installation of new HOLOPHANE Substation Luminaires . . . The unique prismatic design of these units produces efficient, easily-maintained lighting, that is directed upward to the overhead structures, as well as for general ground illumination . . . Another vital HOLOPHANE contribution to lighting and world-progress.

Consult HOLOPHANE Engineers through your professional advisors

ENGINEERS:
Uhl, Hall & Rich, Boston, Mass.
(an affiliate of Chas. T. Main, Inc.)

GENERAL CONTRACTORS:
B. Perini & Sons, Inc.,
Sponsors of joint enterprise
Walsh Construction Company
Morrison, Knudsen Inc.
Peter Kiewit Sons Company
Utah Construction Company

ELECTRICAL CONTRACTOR:
Electrical Constructors, Columbus, O.

Holophane

HOLOPHANE COMPANY, INC.

Lighting Authorities Since 1898 • 342 Madison Ave., New York 17, N.Y.

THE HOLOPHANE CO., LTD., 418 KIPLING AVE. SO., TORONTO 18, ONTARIO

James A. Drain, vice-president of Delta-Star and National Electric Products Division of H. K. Porter Co. (left, talking to George Provost Jr., NAED president), introduced J. W. Mahoney (right), as the new H. K. Porter vice-president for the Western region.

► **Tinling & Powell Inc.** has been appointed a Spokane distributor for **Clark Controller Co.**, handling its line of standard electrical controls. Address is 706 E. Sprague Ave.

► **Robert M. Langmack Co.** of Los Angeles will handle expansion to the West Coast of the aluminum lighting standards department of **Read Standard**, a division of Capitol Products Corp. Standards for outdoor use in residential and business areas will be warehoused in Los Angeles, Langmack said, with partial fabrication on the West Coast scheduled within a year and complete fabrication within two years. Langmack is located at 635 S. Kenmore at Willshire, Los Angeles 5.

Langmack

► **William K. Hargis** has been appointed a southern California district field sales engineer for **Mullenbach Division,** Electric Machinery Mfg. Co., Los Angeles. He formerly was with General Electric, Electric Corp. and Narragansett Wire Co.

► **Lighting Dynamics** has promoted **John Sankewich** to sales manager of its Western Division, with headquarters in the Whittier, Calif., plant. He has had long experience in lighting, sales management and promotion and manufacturing operations. Before his promotion he was regional sales manager for Lighting Dynamics' northern California operations.

Marketing Change

A change in marketing Kennecott wire and cable products was announced by Okonite and Chase Brass & Copper Co. Effective Nov. 1, Okonite assumed responsibility for sales of products made by its Kennecott Division. Formerly most of these copper wire mill products were marketed through the Chase sales force, which will continue to supply certain customers with bare copper wire made by Kennecott.

Chase also will continue to make and supply a complete range of sizes and types of copper bus conductor in flat and tubular form for the electrical industry.

Sales headquarters of the Kennecott Wire and Cable Division will remain at Phillipsdale, R. I., under direction of E. S. Rising, division vice-president.

► **Baxter Sharp Jr.'s** appointment as San Francisco sales representative for the **Moe Light Division,** Thomas Industries, was announced by E. Allen Lea, division sales manager. A native San Franciscan and graduate of the University of Oregon, Sharp was in the industrial rubber and safety equipment fields before joining Thomas Industries.

Day-Brite Conference

Not since 1956 has Day-Brite gathered its more than 90 factory representatives for a big sales meeting but just prior to the IES convention in San Francisco it did so. Even the wives attended and were accorded an entertainment program while the men had a heavy schedule of sessions and demonstrations of new equipment.

Top men of the company, including Chairman of the Board D. J. Biller, President O. W. Klingsick, co-founders of the firm, Gordon Wells, general sales manager, and George Taylor, vice-president in charge of research (IES president), participated. Sales techniques were divested by Joseph E. Burger; telephone techniques presented by Jack Schwartz; and Architect W. R. Smith spoke on "Base Bid Specifications."

Marketing personnel held hour-long sessions on each of the new products. Two features were a new lens box line offering at least 24 combinations from two basic fixtures and a new low-cost light strip. Day-Brite also announced the return to custom fixture manufacturing.

The meetings were designed by General Manager of Sales Gordon Wells and conducted at the Rickey Motel in Palo Alto.

► **John L. McDonald** will be **Admiral's** Southwest regional sales manager, with El Paso, Albuquerque and Phoenix as part of his territory.

► **Tri-State Supply** Corp., Los Angeles, is observing its 25th anniversary. For the past 22 years of its quarter-century history, the manufacturers' agent and distributing company has been at the same location—544 S. San Pedro St.—according to the firm's president, Clarence Bowers.

First visit West for R. J. Sloan, president, Crouse-Hinds Co., Syracuse, shown around by Horace White, division manager

KRALOY...

FIRST PVC RIGID CONDUIT INSPECTED AND PASSED BY UNDERWRITERS LABORATORIES!

Only KRALOY, yes *only* KRALOY, among all plastic conduits, now carries U-L listing—another first for KRALOY! High impact KRALOY PVC (Polyvinyl Chloride) RIGID CONDUIT... the *lifetime* conduit... the *perfect* conduit... won't rust, won't pit, won't corrode, won't support combustion, is non-magnetic and non-sparking. KRALOY needs no paint, no coating, needs no lining, and its mirror-smooth inside wall makes fishing easier than with any other type of conduit. Add these outstanding features to KRALOY's extreme light weight (see chart below) and you have the *ideal* conduit... ideal for direct burial and slab work. Installation costs can be cut *drastically* with light weight KRALOY PVC RIGID CONDUIT. Consider the dollars to be saved in handling and installing U-L listed KRALOY CONDUIT Cat. No. KE-1058 versus steel, *versus even aluminum conduit:*

KRALOY PVC CONDUIT is sold only through wholesale electrical supply houses.

NOTE WEIGHT COMPARISON — KRALOY PVC vs. ALUMINUM vs. STEEL CONDUIT

U.L. required minimum weight per 100 ft. including couplings, lbs.

K-59-29

Trade Size	½"	¾"	1"	1¼"	1½"	2"	2½"	3"	3½"	4"	5"	6"
KRALOY PVC	15.0	20.0	29.0	40.0	47.0	63.0	101.0	131.0	159.0	187.0	253.0	326.0
ALUMINUM	27.4	36.4	53.0	69.6	86.2	115.7	182.5	238.9	287.7	340.0	465.4	612.9
STEEL	79.0	105.0	153.0	201.0	249.0	334.0	527.0	690.0	831.0	982.0	1334.0	1771.0

For complete information on KRALOY PVC CONDUIT and installation directions, mail the coupon or write to Kraloy Plastic Pipe Co., Inc., 4720 East Washington Blvd., Dept. EWT-11, Los Angeles 22, Calif.

NO CONDUIT REPLACES **KRALOY**

Kraloy Plastic Pipe Co., Inc., Dept. EWT-11
4720 East Washington Blvd., Los Angeles 22, Calif.

Gentlemen: Please send me your new Brochure on KRALOY PVC CONDUIT which gives complete information and installation directions.

Name_____

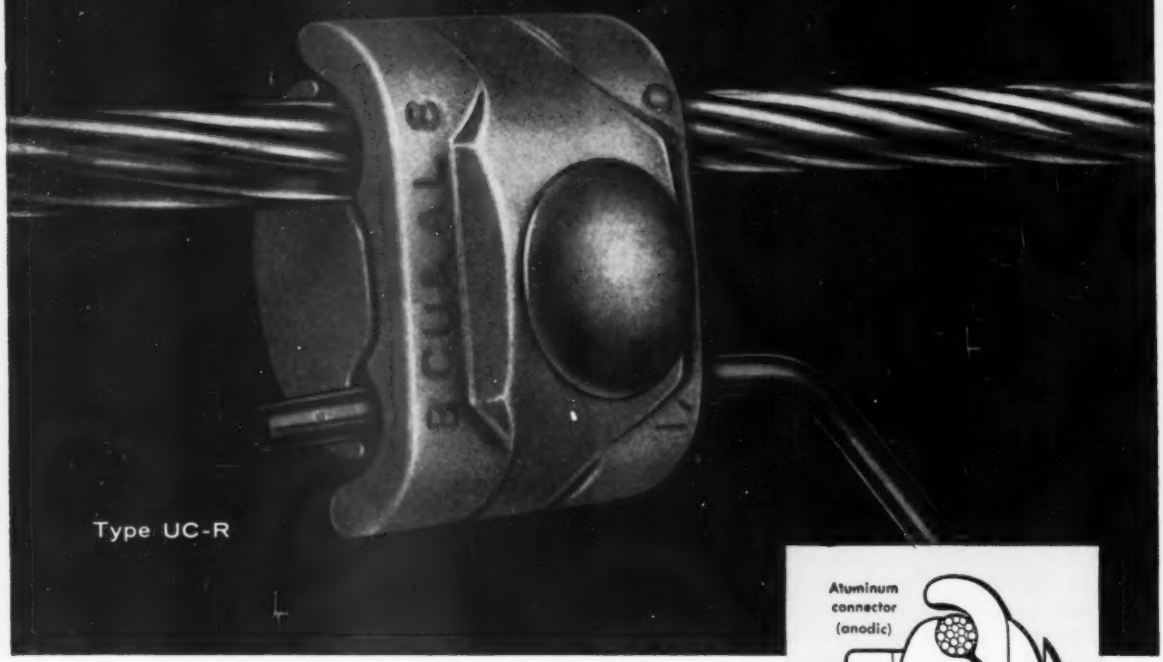
Address_____

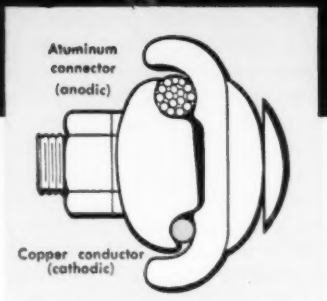
City_____ Zone_____ State_____

TAPIT

connects Aluminum to Copper...

*<u>better</u>... for 35% less**





MASSIVE ALUMINUM TAPIT MINIMIZES CORROSION. The larger the mass of aluminum (anodic) compared to copper (cathodic), the less the galvanic corrosion in an aluminum-to-copper connection. Note massiveness of aluminum TAPIT connector in relation to copper conductor.

Field experience and extensive tests have proven that the massive aluminum TAPIT design withstands effects of galvanic corrosion better than copper-bushed or plated aluminum connectors on aluminum to copper conductor combinations.

*Massive aluminum design also... by eliminating need for copper bushings or special plating... saves at least 35% in cost of connectors for aluminum to copper.

Only five sizes required for joining any conductor combination in #8 thru 400 Mcm range. Stocking is simplified... TAPIT can also be used on aluminum to aluminum. Also available with PENETROX sealed in with STRIPSEAL.

Ask your Burndy representative how you can save 35% on aluminum to copper connections—and get better connections —or write directly to Burndy, Norwalk, Connect., or Toronto, Canada.

TAPIT®— *another engineered solution to your connector problems by*

BURNDY

58-12

Norwalk, Connect. In Europe: Antwerp, Belgium Toronto, Canada

For phone number of closest representative see advertising index in back of book.

People

► **Robert E. Peterson,** former research engineer with the Western Pine Assn., has joined Pacific Power & Light Co. as forest industries specialist. He will work with industrial development organizations and help provide direct services to forest industries of the region.

Peterson

► **Major John F. Kimbel,** for the past three years stationed in London, has reported for duty with the Portland District, Corps of Engineers, and will serve as executive officer.

► **John I. Hoffecker** has been named product engineer for the power transformer division of Westinghouse Electric Corp. in Sunnyvale. He replaces **Alfred W. Pride,** who retired July 1 after 40 years with Westinghouse, most of it working with West Coast utility companies.

► **Jim Willrodt,** field engineer for Line Material Industries, has been assigned to sales duties in L-M's West Coast region. He will work out of the Los Angeles office. He began work with L-M in 1956, after graduating from Marquette University with a degree in electrical engineering. His training was interrupted for two years while he served as a first lieutenant in the Army Corps of Engineers.

Willrodt

► **Eugene Starr,** chief engineer of Bonneville Power Administration, is back at BPA after five weeks of intensive work and travel in India on a special mission for the United Nations Special Fund. He was evaluating India's need for funds to establish two research institutes dealing with power development.

► **Benton M. Bangs Jr.,** an engineering graduate of Washington State College and formerly with Graybar Electric Company, has joined the manufacturers' agency firm of Freeman C. Sharr in Seattle. The firm represents Jefferson Electric Company, Smoot-Holman Company and Tork Time Controls.

► **Don Bornstedt** is new personnel officer of Cowlitz County, Wash., PUD. He replaces **William Patterson** who resigned.

► Appointment of **Carlyle W. Miller** as manager of the Westinghouse Electric Corp.'s San Diego apparatus office was announced in August. He replaces **Ivan E. McDougal,** who has requested a leave of absence for health reasons. Miller has been Pacific Coast manager of the aviation, marine and transporation industries for the apparatus division, with headquarters in San Francisco. He has been with Westinghouse since 1927.

Miller

► **L. N. McClellan,** retired regional director of the Bureau of Reclamation, has been extended a contract by the State of Colorado to continue his earlier investigations of power transmission under the Colorado River Storage Act. He will conduct engineering studies on proposed hydroelectric power transmission and marketing from projects authorized under the act. According to **Felix L. Sparks,** director of the Colorado Water Conservation Board, McClellan's investigations will include such questions as why private power firms are expanding their transmission facilities in the areas to be served by the Glen Canyon and Flaming Gorge Dams.

► **Manuel T. Kennedy,** of Palo Alto, formerly manager of research shops for the Missile Systems Division, Lockheed Aircraft Corp., has joined the engineering staff of Rundel Electric Co. Kennedy has received patents on several machine tool control devices and systems and has authored numerous published technical papers on the subject.

Kennedy

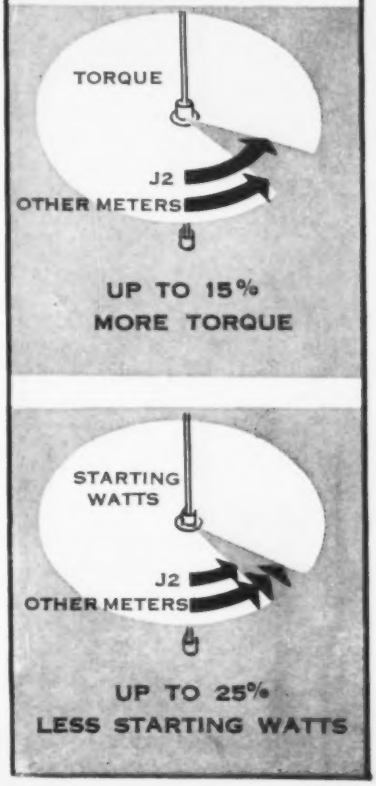
METERMAN'S CHECK LIST

Get Sustained Accuracy Even as System Capacity Grows

Sangamo J2 Watthour Meters provide the long-life accuracy that is so essential as test intervals lengthen and residential loads increase. Uniform load curves from 1.5 through full 200 amperes prove the J2's sustained, "straight line" accuracy on both light and heavy loads.

The J2, with its slow speed, exceptionally high torque, and ability to begin measuring on fewer starting watts than other meters, provides unexcelled extended range metering for all services, present and potential.

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS



AND NOW . . . THE NEW . . .

EAGLE **"SHO-PAK"** ®

GUARANTEED TO ELIMINATE "BOX FUMBLING"

Now you can select the correct EAGLE Receptacle swiftly, save time, speed the job. Provided AT NO EXTRA COST, the new colorful EAGLE SHO-PAK® stands out anywhere, constantly keeps its contents in easy view. Eagle's well known high quality (NO DOUBLE STANDARD) eliminates callbacks. This new modern packaging (AT NO EXTRA COST) saves you more time and money.

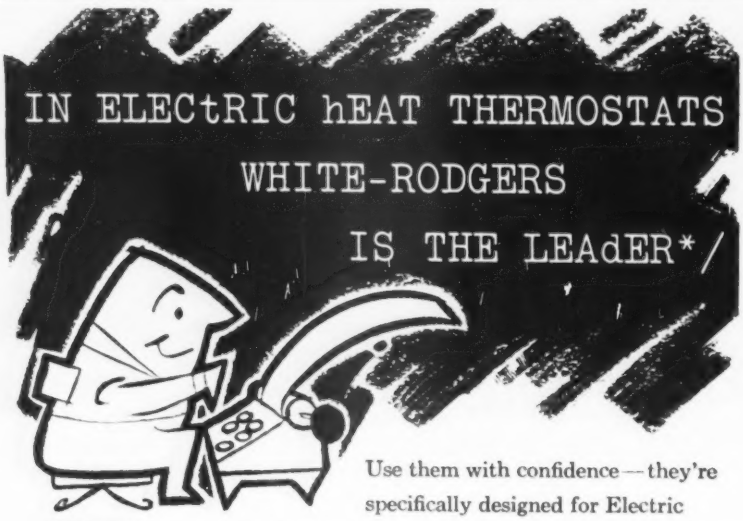
SPECIFY EAGLE
ACCEPT NO SUBSTITUTES

SEND FOR FREE 36 PAGE
POCKET CATALOG

"PERFECTION IS NOT AN ACCIDENT"

Eagle Electric Mfg. Co., Inc., Long Island City, N.Y.

IN ELECtRIC hEAT THERMOSTATS
WHITE-RODGERS
IS THE LEAdER*/



Use them with confidence—they're specifically designed for Electric Heat by White-Rodgers—world's largest maker.

Sold under the brand names of more than fifty manufacturers of quality electric heating equipment.

Type 1A61
World's Largest Seller

Type 1A65
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► **Albert Gruber,** technical research analyst for Washington Water Power Company, has been named economic development engineer. His new duties will be to promote new industry throughout the company's eastern Washington and northern Idaho service territory.

► **Ray M. Taylor,** has been appointed manager of purchases for Southern California Edison Company, succeeding **C. P. Altland,** who died in mid-August. Taylor has been associated with the company for 37 years. Altland, who was 64, died from a heart attack. He had been with the company 40 years.

► **A. L. Chavannes** has succeeded **Thomas J. Gamble** as secretary of Southern California Edison. Gamble retired after 37 years of service. He had been secretary since 1949. Chavannes has been with the company since 1923, and has been assistant treasurer and manager of insurance.

► **F. L. Green** has been appointed chief product design engineer for Prescolite Manufacturing Company in Berkeley. Green was formerly chief engineer with Shalda Manufacturing Company, Inc., and associated with S & M Lamp Company as a design engineer. Announcement of the appointment was by W. D. Runswick, Prescolite vice-president.

Green

► **R. B. MacDonald,** vice-president of Joslyn Manufacturing and Supply Company and general manager of the Joslyn Pacific Company division at Los Angeles, has retired after 37 years. **D. P. Barnes** has been appointed as his successor of the Joslyn Pacific general managership.

► **Robert B. Radnich** has been named local manager in Kittitas County for Puget Sound Power and Light Company. He succeeds **Walter C. McDougall,** who retired after 37 years.

► **Kenneth Arthur Shore** has been named Frazer Valley sales manager for British Columbia Electric Company to succeed the retiring **A. P. "Pat" Croker.**

► **John Riley** succeeded **John Dunstan** as manager of the Spenard Public Utility District in Alaska.

Pickens

Houck

► **Gillette N. Houck** has been named assistant to the manager of the Electrical Conductor Division of Kaiser Aluminum & Chemical Corp. At the same time **Cecil R. Pickens** becomes division technical manager. Houck has been with Kaiser since 1947 and Pickens joined the company in early 1957 when the firm acquired the Wire & Cable Department of United States Rubber Co.

► **W. Leonard Hill** has retired as electric superintendent for the Sacramento division of Pacific Gas and Electric Company and **Frederick L. Nettell** has been appointed his successor. Hill has been with the company for 40 years and Nettell 20 years.

► **Donald S. Bailey,** Twin Falls division manager, has been appointed to a new position of manager of division operations. Succeeding him as Southern Idaho division manager will be **Earl Haroldsen** who is now division sales manager. The new position involves representing division management in the general office.

► **Wayne Brassey** has been appointed field sales manager of the wiring devices department of Harvey Hubbell Inc. He is known in the West as a field sales representative and at one time was assistant manager of the company's San Francisco sales operation. Besides field supervisory activities, Brassey will continue to be responsible for sales training in Bridgeport and in the field.

Brassey

► **Thomas J. Gamble,** secretary of Southern California Edison Co., retired Aug. 1. Elected to succeed Gamble is **A. L. Chavannes,** who has been assistant treasurer and manager of insurance.

► **Robert R. McLagan** has been made superintendent of Pacific Power & Light Co.'s Portland power district. He was Willamette area power superintendent at Springfield. In Portland he succeeds **John A. Hooper,** who retired. **Lloyd E. Wallace,** who has been power superintendent of PP&L's Coos Bay district, will move into the Willamette Valley power superintendent spot.

► **C. R. "Russ" Leever,** Wyoming division engineer for Pacific Power & Light Co. at Casper, has been elected president of the Central Wyoming Society of Professional Engineers.

► **G. H. Milligan** is new director of public information and consumer service for Calgary Power Ltd. He has been an employee of the company 34 years.

► **Fred C. Murdock** has been named manager of the Westinghouse Electric Corp.'s manufacturing and repair plant in Salt Lake City. Murdock is a Stanford University mechanical engineering graduate. He succeeds Gerald M. Ireland who moves to Emeryville. He has worked at both the company's Sunnyvale and Emeryville plants and at one time was manager of the M & R plant in Portland, Ore. He also attended Westinghouse management training courses in Pittsburgh.

Murdock

► **Maxwell Rosen,** one-time vice-president and general manager of Incandescent Supply Company, has joined the J. A. Berko Company in Los Angeles. Berko products include picture lights and portable lamps.

► **John W. Myers,** president of Myers Electric Products Inc. and a member of the Los Angeles Electric Club since 1951, died recently.

► **J. Coleman Jones,** 58, general superintendent of Pacific Power & Light Co.'s operations and construction division, died Oct. 10 after collapsing of a heart attack while on a hunting trip. A native of Greenville, Tex., Jones was graduated from the University of Texas and Massachusetts Institute of Technology with degrees in electrical engineering. For 23 years before joining PP&L, he was an executive with the Florida Power & Light Co. at Miami. He was a member of the American Institute of Electrical Engineers.

METERMAN'S CHECK LIST

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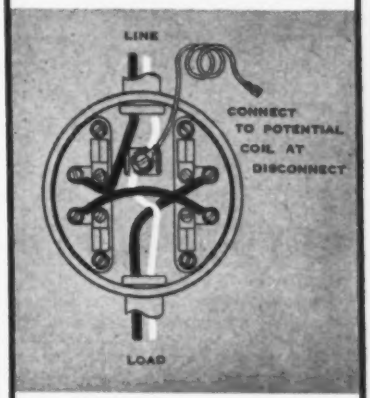

All connections are external, make conversion from 2-wire to 3-wire service simple. The same meter is used for the new 3-wire service; there are no returns to the shop for conversion. The J2 eliminates the need to retire meters before their time, protects investments in 2-wire services, reduces and simplifies stock inventory.

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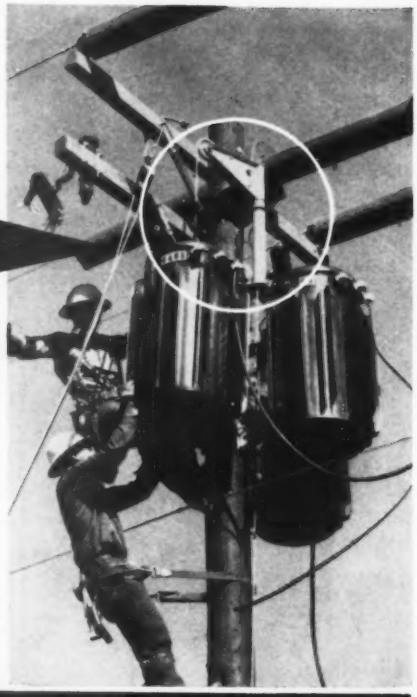

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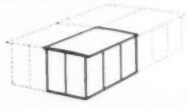

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Associations

PCEA Appointments

According to President Charles A. Wikle, the organization of PCEA committees, to function during his administration, is well under way. Many of the committees are already completely set up, while in others the chairmen and vice-chairmen have been appointed and are now selecting the committeemen who are to serve with them.

Appointments that have been made thus far are as follows:

Administrative Services Section

Guidance Committee—R. W. White, Pacific Gas and Electric, chairman; W. T. Quinsler, Arizona Public Service, vice-chairman.

Advisory Committee—E. B. Kruger, So. Calif. Ed.; W. N. Fairlee, PG and E; J. A. Talley, California Electric Power; F. W. Mielke Jr., PG and E; J. T. McNab, Arizona PS.

Business Development Section

Guidance Committee—H. L. Moore, So. Calif. Ed., chairman; F. M. Falge, Live Better Electrically, vice-chairman; J. C. Beckett, Wesix Electric Heater Co.; J. B. Caldwell, Okonite Co.; W. F. Chapman, San Diego Gas & Electric; A. O. Grotenhuis, Thomas Industries Inc.; Paul H. Henrichs, So. Calif. Ed.; U. G. Karrer, PG and E; F. E. Lucking, Calectric; W. H. Mayben, Graybar Electric Co.; Otis R. Monroe, So. Calif. Ed.; L. S. Prince, Westinghouse Electric Supply; R. E. Riley, Anaconda Wire & Cable; R. L. Sawyier, PG and E; C. O. Walther, Zinsco Electrical Products; R. R. Whittaker, Calectric; J. D. Whitnell, Arizona PS.

Advisory Committee—D. S. Aiken, PG and E; G. F. Black, Rome Cable Corp.; J. C. Chamberlain, Bureau of Home Appliances, San Diego; J. A. Corlett, G-E; Jack Kiedaisch, Arizona PS.

Agricultural Electrification Committee—R. R. Whittaker, Calectric, chairman; R. L. Saling, Westinghouse, vice-chairman.

Appliance Committee—W. H. Mayben, Graybar, chairman; F. E. Lucking, Calectric, vice-chairman.

Commercial Cooking Committee—Otis R. Monroe, So. Calif. Ed., chairman; S. O. Blois, PG and E, vice-chairman.

Heating and Air Conditioning Committee—J. C. Beckett, Wesix, chairman; R. V. Southworth, Sues, Young & Brown, vice-chairman.

Home Economics Committee—Evelyn R. Conant, So. Calif. Ed.; Helen Randal Taaffe, Westinghouse Appliance Sales, co-chairman.

Commercial-Industrial Lighting Committee—J. D. Whitnell, Arizona PS, chairman; F. J. Bertolone, Curtis-AllBrite Lighting Inc., vice-chairman.

Residential Lighting Committee—R. L. Sawyier, PG and E, chairman; A. O. Grotenhuis, Thomas Industries, vice-chairman.

Power Utilization Committee—Paul H. Henrichs, So. Calif. Ed., chairman; U. G. Karrer, PG and E, vice-chairman.

Commercial-Industrial Wiring Committee—L. S. Prince, Westinghouse Supply, chair-

man; J. B. Caldwell, Okonite, vice-chairman.

Residential Wiring Committee — R. E. Riley, Anaconda, chairman; C. O. Walther, Zinsco, co-chairman.

Engineering and Operating Section

Guidance Committee—G. R. Best, G-E, chairman; H. K. Breckenridge, Ebasco Services, vice-chairman; G. V. Arata, Pelton Div., Baldwin-Lima-Hamilton; D. E. Argo, A. B. Chance Co.; R. S. Baird, General Telephone Co.; D. P. Cady, Maydwell & Hartzell; A. D. Crino, Allis-Chalmers; W. R. Gould, So. Calif. Ed.; Sylvester Lemezie, Westinghouse; A. E. McKenzie, Kelman Div., I-T-E Circuit Breaker Co.; Einar Nilsson, PG and E; Dean Ramsden, Pacific Coast Engineering Co.; R. L. Tilford Jr., San Diego G&E; A. W. Tracy, Anaconda; R. M. Waggoner, Hubbard & Co.; H. S. Warren, Rome Cable; D. M. Wiseman, Calectric.

Advisory Committee—K. M. Bausch, Bechtel Corp.; F. E. Bodine, Westinghouse; R. L. Allen, Southern Nevada Power; W. E. Brinton, PG and E; J. H. Drake, So. Calif. Ed.; W. T. Johnson, Calectric.

Accident Prevention Committee — R. E. McCann, So. Calif. Ed., chairman; Harry Brown, Sierra Pacific Power; C. E. Dunahoo, San Diego G&E; C. W. Eddy, Calectric; W. J. Froome, Hawaiian Electric; Warren S. Hyde, PG and E; H. J. Kallenmeyn, PG and E; J. H. Sime, So. Calif. Ed.; Charles E. Story, So. Calif. Ed.; C. L. Yager, PG & E.

System Protection Committee — F. D. Beardsley, PG and E, chairman; L. D. Barter, Artwel Electric; C. B. Bennett, Fluor Corp.; W. A. Davis, San Diego G&E; A. B. Gilbertson, California-Pacific Utilities; G. B. Gilcrest, G-E; F. V. Gillum, So. Calif. Ed.; C. K. Grant, Calectric; M. G. Jerome, Pacific Tel & Tel; A. E. Johnson, I-T-E Circuit Breaker; R. K. McKnight, Arizona PS; R. L. Mellers, Westinghouse; W. S. Moody, G-E; C. L. Ryan, So. Nevada Power; Mark A. Sawyer, Pacific Tel & Tel; W. J. Smith, Federal Pacific Electric; R. E. Stade, Bechtel; G. P. Tugger, Westinghouse; H. Z. Wilson, General Telephone; W. J. Wright, Sierra Pacific Power; Harold Zamzow, Line Material Industries.

General Committees

Budget and Finance Committee — Fred Oldendorf Jr., Calectric; R. H. Gerdes, PG and E; H. F. Hartzell, Maydwell & Hartzell; J. K. Horton, So. Calif. Ed.; C. C. Walker, G-E; K. C. Christensen, PG and E; V. W. Hartley, PCEA.

Code and Ordinance Committee — W. S. Flowers, PG and E; Arthur C. Veit, Los Angeles County supervising electrical engineer, co-chairmen.

4-H Club Electric Project Committee — D. L. Turner, San Diego G&E, chairman; F. H. Coover, So. Calif. Ed.; B. D. Johnson, PG and E; J. M. Mims, Calectric; R. L. Saling, Westinghouse.

Highway and Residential Street Lighting Committee—H. F. Hartzell, Maydwell & Hartzell, chairman; H. G. Dillin, San Diego G&E; O. R. Doerr, PG and E; T. M. McDaniel Jr., So. Calif. Ed.

Highway and Residential Street Lighting Technical Subcommittee — B. A. Corwin, So. Calif. Ed., chairman; J. H. Burson, Westinghouse; Peter Garippa, G-E; J. E. Hammond, PG and E; R. M. Huggard, Sierra Pacific Power; G. S. Kimball, San Diego G&E; B. V. Kunde, Line Material; L. W. Luley, Westinghouse; E. L. Ralston Jr., Hawaiian Electric; W. H. Ritter Jr., Calectric; F. A. Stortz Jr., G-E; G. A. Trosper, PG and E.

Membership Committee — Ellis Larkins, PG and E, chairman; E. H. Galchutt, Graybar Electric, co-chairman.

Resolutions Committee — C. W. Leihy, Electrical West, chairman.

► **Oregon Rural Electric Cooperative Assn.** changed the previously announced dates of its meeting at Eugene Hotel, Eugene, Ore., to Dec. 3 and 4 in order not to conflict with the Dec. 10 and 11 dates for the meeting of the Washington PUD Assn. in Seattle.

► **Illuminating Engineering Society** members in the San Francisco Bay region had a decision to make last month. The chartering of a new Diablo Section full-blown, in the Oakland and East Bay area, splintered the Golden Gate Section and caused members to have to choose to which they would belong. Members are welcome to attend meetings of both but the mailing of notices was at stake, James E. Barnes, regional vice-president, announced.

Meetings Calendar

NOVEMBER

5-6—*Pacific Coast Electrical Assn.*, Hawaiian conference, Princess Kaiulani Hotel, Honolulu.

12-14—*Canadian Electrical Assn.*, Western Zone, General and Sales Division meeting, Bessborough Hotel, Saskatoon, Sask.

16-17—*PCEA, Administrative Services*, Rickey's, Palo Alto, Calif.

16-18—*CSA*, Engineering Divisions, Palliser Hotel, Calgary.

18-20—*Inter-Industry Farm Electric Utilization Council*, 6th annual National Electric Farm Power conference, Westward Ho Hotel, Phoenix.

27-Dec. 2 — *San Diego Bureau of Home Appliances*, annual Electrical and Home Appliance Show, Electric Building, Balboa Park, San Diego.

JANUARY 1960

11-15—*Winter Market*, Western Merchandise Mart, San Francisco.

FEBRUARY

—*Intermountain Electrical Assn.*, annual conference.

—*Snake River Valley Electrical Assn.*, annual conference.

—*San Diego Bureau of Home Appliances*, spring conference, House of Hospitality, Balboa Park, San Diego.

29-March 1—*Pacific Coast Electrical Assn.*, Business Development Section, Hotel Lafayette, Long Beach.

METERMAN'S CHECK LIST

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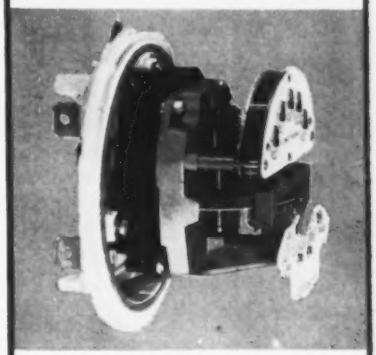
The Sangamo J2 Watthour Meter has corrosion resistant construction designed to end maintenance problems caused by weather and atmospheric conditions.



The corrosion resistant finishes used on the J2 are the finest available, anywhere. But, they do change (for the better) because the search for ideal finishes is never-ending. Meters are tested under actual operating conditions in corrosive atmospheres even as Sangamo chemists develop new finishes. As a result of these tests and continuing chemical research, the corrosive resistant characteristics of the J2 meter are being improved constantly.

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SPRINGFIELD, ILLINOIS

INDEX TO ADVERTISERS AND WESTERN

November 1959

Allen-Bradley Co. 103, 104
Los Angeles ANgelus 9-9421
San Francisco: Campbell & George MIssion 8-1236
Denver: Young Electric AComa 2-4841
Albuquerque: A & A Supply ALpine 6-0307
Salt Lake City: Stevens Sales INgersoll 7-5489
Phoenix: Edw. P. Weiler AMherst 6-3188
Seattle: J. A. Tudor Associates MUtual 2-7444
Portland: J. A. Tudor Associates BEImont 2-1188

Allis-Chalmers Mfg. Co. 17, 38, 39, 41
San Francisco DOuglas 2-8384
Los Angeles MAdison 6-2231
Phoenix CRestwood 4-5426
Denver CHerry 4-6556
Salt Lake City EMpire 3-1723
Portland CApitol 2-9835
Seattle MAin 4-3737

Aluminum Co. of America 83, 84, 85, 86
San Francisco YUkon 6-6484
Los Angeles HUntley 2-2684
Denver DUdley 8-1619
Spokane RIverside 7-6124
Seattle MAin 4-4040
Portland CApitol 2-9861
Boise 2-8038

American Pamcor, Inc. 107
Los Angeles (Hawthorne) ORegon 8-5284
Burlingame: Peters-deLaet, Inc. OXford 7-1800

Arvin Industries, Inc. 35
San Francisco: D. E. Sanford Co. MArket 1-0303
Los Angeles: Floyd Yudelson DUnkirk 7-6121
Portland: Earl B. White ALpine 3-3226

Baldwin-Lima-Hamilton 6, 47
San Francisco MIssion 7-6781
Los Angeles MAdison 6-5631
Portland BEImont 2-4174
Seattle MAdison 4-5420
Denver ATlas 8-2684
Salt Lake City HUnter 5-0293

Blackburn Corp., Jasper 13
San Francisco: Donald E. Ingalls JUniper 6-0332
Los Angeles: Robert M. Schow HUbbard 3-7931
Vancouver, Wn.: Wm. A. Horning OXford 4-4475
Phoenix: W. C. Osborn WIndsor 3-1815
Denver: Sales Engineers Co. AComa 2-4893
Salt Lake City: Sales Engineers (James D. Stephens) EMpire 3-7402

Brown Co. 40
San Francisco YUkon 2-1986
Sold through Westinghouse Electric Supply offices below:
Los Angeles MAdison 9-4161
Phoenix ALpine 8-8211
Seattle MAin 3-7001
Portland CApitol 2-9851
Spokane FAirfax 8-3371
Salt Lake City DAvis 2-2441
San Diego: Elec. Supplies Dist. Co. BEImont 2-8161
Denver: Mine & Smelter Supply Co. KEystone 4-3111

Brown Boveri Corp. 50
Portland CApitol 3-7234
San Francisco: Belilove Co. YUkon 2-3713
Pasadena: A. B. Smedley SYcamore 8-1174
Denver: Slaybaugh-Thompson Co. AComa 2-5826

Burndy Corp. 112
Shaffer & Nelson, Inc. following cities:
Portland BEImont 4-7437
Seattle MUtual 2-0186
Spokane FAirfax 7-9528
San Francisco: George E. Honn Co. SUtter 1-7352
Los Angeles: Earl S. Condon Co. DUnkirk 1-3951
Denver: Peterson Co. DExter 3-5434

Classified 116

Crouse-Hinds Co. 26
San Francisco GArfield 1-5267
Los Angeles RIchmond 9-3189
Seattle ATwater 3-7262
Portland CApitol 7-2115
Denver TAbor 5-6639
Salt Lake City EMpire 3-5513

Curtis-AllBrite Lighting, Inc.
Curtis Lighting Division 42, 43
All-Brite Lighting Div. in following cities:
South San Francisco PLaza 5-7077
Monterey Park, Calif. ANgeles 8-1144
Seattle EAst 5-9600
Denver SKyline 6-1668

Eagle Electric Mfg. Co., Inc. 114
San Francisco: Brill Electric Sales SUtter 1-7547
Los Angeles: D. Niemann MAdison 6-7736
Portland: M. Levin CApitol 2-9591

Edwards Company, Inc. 24
Los Angeles MAdison 8-2286
San Francisco UNderhill 1-5800
Denver: H. F. Ream Sales Agency CHerry 4-0558
Phoenix: J. A. Ware, Jr. ALpine 2-9388
Portland: D. A. King CApitol 8-1990
Seattle: F. A. Strohecker MAin 3-0357
Spokane: E. Johnston MUtual 2-3597

Electro Compound Co. 119
Los Angeles: Golsan Co. RIchmond 7-5486
Portland: Oregon Mfg. Agents Capitol 6-3971
Denver: R&M Sales Spruce 7-2515
San Francisco: Electrical Sales Co. EXbrook 7-2087

Fargo Mfg. Co. Inc. 51
Sold thru Line Material Industries:
San Francisco: PLaza 5-8600
Los Angeles: RAymond 3-6251 and OXford 5-2260
Denver FLorida 5-1689
Portland CApitol 2-1981
Seattle ATwater 3-6368
Spokane KEystone 5-2461
Salt Lake City ELgin 5-6257
Phoenix: J. E. Redmond Co. ALpine 4-8471

Federal Pacific Electric Co. 23
San Francisco ATwater 2-0810
Los Angeles CLinton 7-8281
Seattle ATwater 3-7801
Oswego, Ore. NEptune 6-4573
Salt Lake City: James Stephens Co. ELgin 5-3540
Denver: R. D. Florence Co. AComa 2-1573
Hamilton Associates CHerry 4-1505
Albuquerque: F. W. Gorman CHapel 7-1596
Phoenix: Elec'l. Eng. & Sales Corp. ALpine 3-0927

Fisher-Pierce Co. Inc. 14, 15, 25
San Francisco: Maydwell & Hartzell ATwater 8-6900
Los Angeles: Maydwell & Hartzell MAdison 8-7245
San Diego: Maydwell & Hartzell JU 2-6749
Phoenix: Maydwell & Hartzell ALpine 2-5858
Seattle: Oscar Hogenson MAin 2-0737
Portland: J. A. Tudor Asso. BEImont 2-1188
Denver: Allen I. Williams MAine 3-0343

Fluor Corp. Ltd. 92, 93
Los Angeles ANgelus 2-6111
San Francisco SUtter 1-5805

Graybar Electric Co. Inc. 3rd Cover
San Francisco MArket 1-5131
Los Angeles ANgelus 3-7282
Phoenix ALpine 2-2371
Denver TAbor 5-7111
Boise Boise 2-4501
Butte Butte 3233
Portland CApitol 7-6641
Seattle MUtual 2-0123
Salt Lake City ELgin 9-8771

General Electric Co.
Cleveland, Lamp Div. 95
Oakland LOckhaven 9-3222
Los Angeles DUnkirk 5-1681
Denver AMhurst 6-0285
Seattle MAin 2-8081
Portland CApitol 3-2101

Greenlee Tool Co. 10
San Francisco: Lippincott Co. Inc. EXbrook 2-2687
Los Angeles: Lippincott Co. Inc. MAdison 8-8186
Seattle MAin 3-3085
Salt Lake City CRestwood 7-1298

Hathaway Instrument Div.
Hamilton Watch Co. 31
Denver SKyline 6-8301
Los Angeles VE 7-3311
Also EX 8-3079
Albuquerque, N. M.: A. I. Williams Co. ALpine 5-9632

Hill Transformer Co. 4th Cover
San Carlos LYtel 3-2161
Los Angeles: Maddox Sales Co. MAdison 4-2306
Seattle: J. A. Tudor & Assoc. MUtual 2-7444
Portland: J. A. Tudor & Assoc. BEImont 2-1188
Denver: H. C. Guire SPruce 7-2864
Salt Lake City: Stevens Sales INgersoll 7-5489
Phoenix: Maddox Sales Co. ALpine 2-2371
Albuquerque: Ralph D. Black Co. ALpine 5-9265

Holophane Co. Inc. 109
San Francisco YUkon 2-9655
Bremerton, Wash. TRiangle 6-4069
Montebello, Calif. RAymond 3-5738
Littleton, Colo. PYramid 4-4527

International Business Machines 78, 79
Los Angeles DUnkirk 1-3696
San Francisco YUkon 2-0100
Denver AComa 2-9373
Seattle MUtual 2-4640
Portland CApitol 8-6623
Salt Lake ELgin 9-7721

Jet Line Gun Co. 18

Kearney Corp., James R. 37
Maydwell & Hartzell, Inc., in following cities:
San Francisco ATwater 8-6900
Los Angeles MAdison 8-7245
Seattle MAin 4-2368
Portland CApitol 8-4173
Spokane MAdison 4-3285
Phoenix ALpine 2-5858
San Diego JU 2-6749
Salt Lake City: Conely Engineering Co. EMpire 3-5013
Golden, Colo.: Ralph Smith CRestview 9-5279

Kerite Co. 97
San Francisco GArfield 1-2916
Glendale, Calif. CHapman 5-3721

KPF Electric Co. 19
Stockton, Calif. HOward 4-8381

Kraloy Plastic Pipe Co. Inc. 111
Los Angeles: ANgelus 1-4158
San Francisco: The Curry Co. YUkon 2-0788
Seattle: Fred Carlson Co. ATwater 4-4630
Denver: Kenneth B. Schomann Co. FRemont 7-3023
Albuquerque: Ralph B. Black ALpine 5-9625

Lapp Insulator Co. Inc. 48, 49
San Francisco: Donald E. Ingalls JUneau 6-0332
Los Angeles: Earl S. Condon & Co. DUnkirk 1-3951
Seattle: Charles F. James MAdison 3-1531
Salt Lake City: Riter Engineering Co. EMpire 3-7933
Butte: R. E. McDonough Co. 2-5447

Lighting Dynamics 120
San Diego KImberly 5-4993
Los Angeles RAymond 3-9101
San Francisco JUniper 6-5266
Portland: Clyde Dodd CApitol 7-6557
Seattle: Don Gleason LAkeview 5-5151
Phoenix: Ray Wendling ALpine 2-2541

McCabe Powers Auto Body Co. 3
Berkeley LAndscape 4-4416
Portland BEImont 6-1178
Pomona NAtional 4-6464
Phoenix BRidge 5-5774
Salt Lake City DAvis 2-5658
Spokane FAirfax 5-2591
Los Angeles RIchmond 9-3424

McGraw-Hill Book Co. 119
San Francisco DOuglas 2-4600
Los Angeles HUntley 2-5450

Moloney Electric Co. 4, 5
Garland Affolter in following cities:
San Francisco EXbrook 7-1800
Los Angeles MAdison 4-1864
Portland CApitol 3-7349
Seattle MUtual 2-4950
Denver: Hamilton Associates CHerry 4-1505
Salt Lake: Riter Engineering EMpire 3-7933

Morrison-Pelsue 116
Denver RAce 2-2834
North Hollywood: A. F. Johnson STate 7-8544
Salt Lake City: W. H. Pingree Co. EMpire 3-6731

National Supply Co., Tubular Prod. Div. 16
San Francisco DOuglas 2-2975
Los Angeles: Murphy-Hain Co. MAdison 2-2138
Seattle: J. H. Stumph MUtual 2-5232
Denver: Allen B. Carpenter KEystone 4-0283
Farmington, Utah: David Merrill AXtel 5-4631

(Continued on page 119)

SALES OFFICES

(Continued from page 118)

Orangeburg Mfg. Co. Inc. 44
San Francisco YUkon 6-0462
Santa Ana LIncoln 4-1195
Seattle MUtual 2-4566
Newark, Calif. SYcamore 3-2200

Pacific Gas and Electric Co. 54
San Francisco SUtter 1-4211

Pennsylvania Transformer Div. 45, 45
San Francisco: George E. Honn Co. SUtter 1-7352
Los Angeles: John G. Cerrin . MAdison 2-0830
Seattle: Fred W. Carlson ATwater 4-4630
Phoenix: Roy E. Coulson WIndsor 3-8935
Denver: Peterson Co. DExter 3-5434
Salt Lake City: Clarence W. Silver ELgin 5-5378
Portland:
Fred W. Carlson & Associates CApitol 8-3798
Boise, Ida.: Clarence W. Silver Co. 2-6947
Albuquerque:
Williamson Sales Co. ALpine 6-6617

Porta House 116
Oakland OLympic 2-7237
Sacramento: Robert Crownin GIlbert 3-8543
Portland: Bardi Gen. Contractors PRospect 5-4354
Los Angeles: Construction Supply Co. LUdlow 3-4158
Los Angeles: Ball & Black ANgelus 9-7586
San Bernardino: Kingsley, H. P. TUrner 9-8551
Santa Ana: Blystone Equip. Co. KImberly 2-3918

R T & E Corp. 2nd Cover
Portland MErcury 9-2161
Medford: H. L. Mooney SPring 2-9948
San Jose: N. R. Beebe ANdrews 4-5641
Pasadena: D. B. Cole SYlvan 0-5977
Salt Lake City: T. R. Van Wagoner Co. INgersol 6-2461
Bellevue, Wn.: K. H. DuBois SHerwood 6-4114
Butte: R. A. Manning Butte 2-9200

Republic Steel Corp. 11
San Francisco GArfield 1-0977
Los Angeles MAdison 4-5144
Portland: Shaffer & Nelson Inc. BElmont 4-7437
Seattle: Shaffer & Nelson Inc. MUtual 2-0186
Spokane: Shaffer & Nelson Inc. FAirfax 7-9528
Denver: C. D. Belt Co. SKyline 6-9421

Roberson, Inc. 119
Seattle LAkeside 3-1189
Seattle: Palmer Electric Co. MA 2-2170
Spokane: Wm. C. Knapp FAirfax 7-3621
Spokane: Inland Electric Co. FAirfax 7-1521
Tacoma: Bean Electric Co. MArket 7-3144
Los Angeles: O. B. Wilt Co. NOrmandy 1-4100
San Carlos, Calif.: O. B. Wilt Co. LYtel 1-2618
Graybar Electric Co. Inc., all principal cities

Rome Cable Corp., Div. of Alcoa 55, 56, 57, 58
Los Angeles RAymond 3-3631
San Francisco VAlencia 6-3580
Seattle MAdison 4-3017
Salt Lake City ELgin 9-8811
Denver KEystone 4-0533

Royal Electric Corp. 8
Los Angeles: Eckert-Lloyd Co. RIchmond 7-9655
San Francisco: Eckert-Lloyd Co. HEmlock 1-5792
Seattle: Northwestern Agencies MAin 3-8882
Portland: Northwestern Agencies CApitol 7-0434
Phoenix: Wm. Benndorf CRestwood 7-1662
Denver: Hyde Electronics Co. WEst 6-3456

S & C Electric Co. 32, 33
Burlingame, Calif. OXford 7-1130
El monte, Calif.: Randolph Eng. Corp. CUmberland 3-4183 and 3-7901 GIlbert 3-1701
Phoenix: Randolph Eng. Corp. ALpine 8-5281
Salt Lake City:
Riter Engineering INgersoll 7-9449
Seattle: Muth-Richards Co. EAst 3-2128
Portland: Andrew L. Polich, Inc. CApitol 3-6241

Sangamo Electric Co. 113, 115, 117
San Francisco: L. A. Nott HEmlock 1-4738
Los Angeles: (Factory Sales) DUnkirk 7-2336
(Time Switches) ANgelus 8-6771
Seattle: T. R. Wood MAin 3-8204
Denver: Mt. States Machinery CHerry 4-7421
Phoenix: J. E. Redmond Co. ALpine 4-8471
Portland: R. L. Schoenberger CApitol 3-8742
Butte: R. E. McDonough Butte 2-5447
Tucson AXtel 8-4801
Albuquerque:
Gorman Engineering CHapel 71596
El Paso: Gorman Engineering KEystone 2-3449

Smoot-Holman Co. 36
San Francisco MArket 1-8474
Los Angeles ORegon 8-8981
Salt Lake City: J. R. Christensen EMpire 3-4419
Seattle: F. C. Scharr ATwater 2-9230
Portland: Clay Barton CApitol 8-3520

Southern California Edison Co. 34
Los Angeles MAdison 4-7111

Southern States Equipment Corp. 12
Seattle: Jos. C. Platt MAin 3-6141
Salt Lake City: H. Lee Rawlings Co. ELgin 9-8811
Denver: R. T. Lewis Co. EAst 2-1082
Los Angeles: W. E. Kirk Co. MAdison 4-3651
Portland: C. F. Selby NEptune 6-6442
Oakland: John H. Ormond TWinoaks 3-3235

Square D Co. 98, 99
Los Angeles CApitol 1-1171
San Francisco JUniper 7-4590
Seattle EAst 3-1474
Portland BElmont 4-8488
Denver KEystone 4-6234
Salt Lake City DAvis 2-5859
Phoenix ALpine 8-6448
El Paso KEystone 3-0544
Spokane FAirfax 8-3690
San Diego BElmont 3-7621
Fresno AMherst 8-6268

Subox, Inc. 9
San Francisco: Wrathal & Krusi EXbrook 7-3593
Los Angeles: R. E. Cunningham & Son MAdison 8-1105
Portland: Wm. J. Cottrell & Assoc. CApitol 7-6191
Seattle: W. R. Hendry Co. MAine 3-3968
Denver: Ambler Co. TAbor 5-8885

Wagner Electric Corp. 20
South San Francisco PLaza 6-0520
El Segundo, Calif. ORegon 8-7671
Portland CApitol 7-3654
Salt Lake City EMpire 3-5013
Denver CHerry 4-7421
Seattle MAin 2-2342

White-Rodgers Co. 114
Los Angeles MAdison 8-1211
Portland BElmont 4-7523
San Francisco: Kenneth Hill WEst 1-2612
Mountlake Terrace, Wash.: L. Wren PRospect 6-5931
Denver BElmont 7-0709

Western Insulated Wire Co. 30
Los Angeles LUdlow 7-7103
San Francisco: Curry Co. YUkon 2-0788
Seattle: J. H. Stumph Co. MUtual 2-5232
Albuquerque: John Carder CHapel 2-3581
Salt Lake City:
T. R. Van Wagoner INgersoll 6-2461
Portland: George M. Roth CApitol 7-5654

Westinghouse Electric Corp. 28, 29, 52, 53
San Francisco EXbrook 2-5353
Los Angeles MAdison 6-3881
Denver KEystone 4-8121
Phoenix ALpine 8-8621
Salt Lake City ELgin 5-3413
Seattle MAin 2-0808
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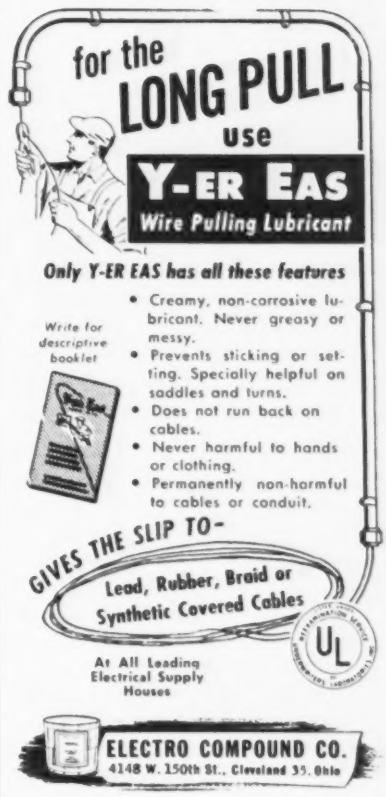
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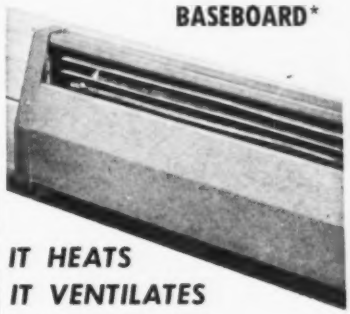

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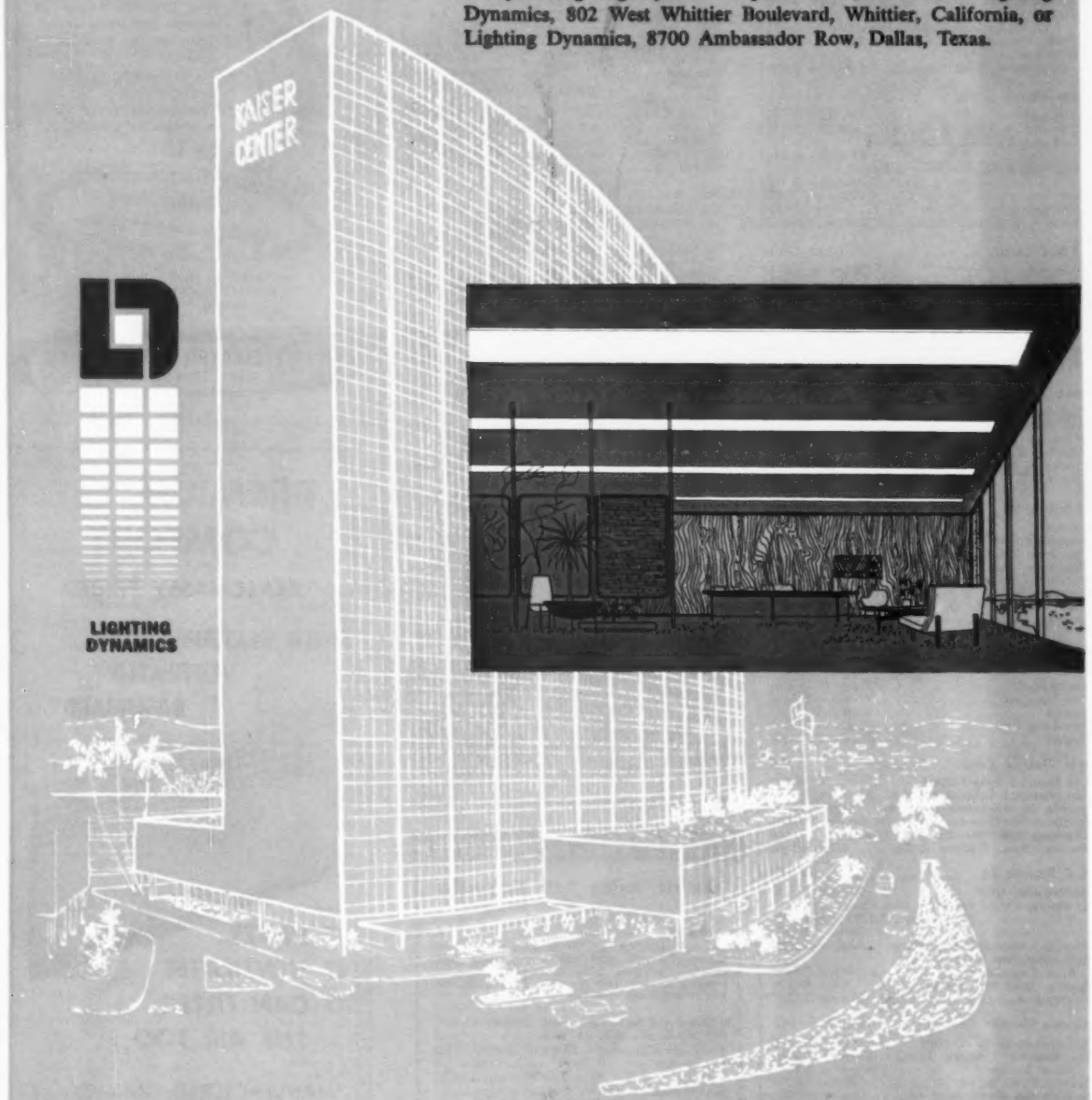

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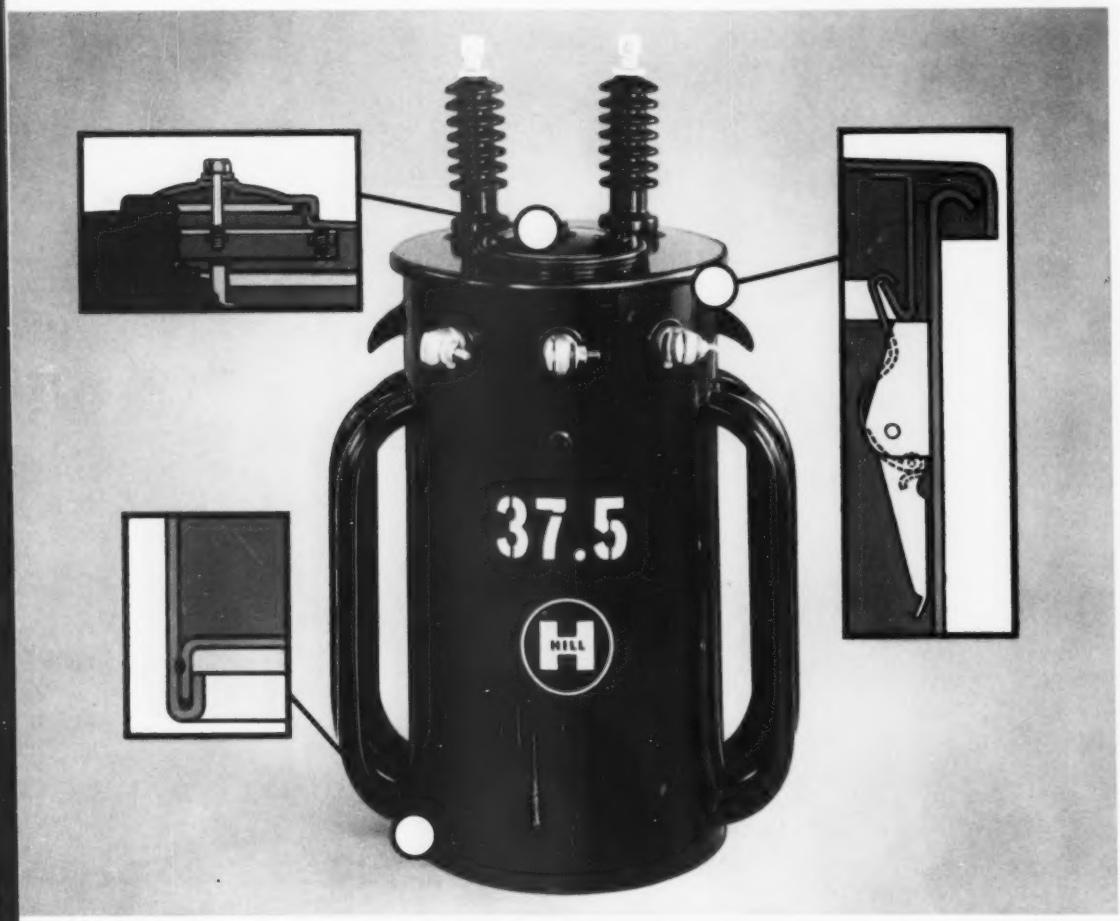

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